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AN ORGANIZATION FOR: THE ENCOURAGEMENT OF PHARMACEUTICAL RESEARCH AND THE PROMOTION OF FRIENDLY INTERCOURSE AMONGST PHARMACISTS.

This Association of Chemists and Druggists and others interested in Pharmacy is managed by about twenty unpaid officers annually elected by the members.

ANNUAL MEETINGS OF MEMBERS.

1863, NEWCASTLE. 1864, BATH. 1865, BRIMINGHAM. 1866, NOTTINGHAM. 1867, DUNDEE. 1868, NORWICH. 1869, EXETER. 1870, LIVERPOOL. 1871, EDINBURGH. 1872, BRIGHTON. 1873, BRADFORD. 1874, LONDON. 1875, BRISTOL. 1876, GLASGOW. 1877, PLYMOUTH. 1878, DUBLIN. 1879, SHEFFIELD. 1880, SWANSEA. 1881, YORK. 1882, SOUTHAMPTON. 1883, SOUTHPORT. 1884, HASTINGS. 1885, ABERDEEN. 1886, BIRMINGHAM. 1887, MANCHESTER. 1888, BATH. 1889, NEWCASTLE-ON-TYNE. 1890, LEEDS. 1891, CARDIFF. 1892, EDINBURGH. 1893, NOTTINGHAM. 1894, OXFORD.

The chief business of the meetings is the communication of written descriptions of original investigations made by members during the year, and includes discussions on such papers by the assembled members and visitors.

Presidents:—

1863-4, 1864-5, H. DEANE, F.L.S.; 1865-6, 1866-7, Prof. BENTLEY, M.R.C.S.; 1867-8, 1868-9, D. HANBURY, F.R.S.; 1869-70, 1870-1, W. W. STODDART, F.C.S.; 1871-2, 1872-3, H. B. BRADY, F.R.S.; 1873-4, 1874-5, T. B. GROVES, F.C.S.; 1875-6, 1876-7, Prof. REDWOOD, F.C.S.; 1877-8, 1878-9, G. F. SCHACHT, F.C.S.; 1879-80, W. SOUTHALL, F.L.S.; 1880-1, R. REYNOLDS, F.C.S.; 1881-2, 1882-3, Prof. ATTFIELD, F.R.S.; 1883-4, J. WILLIAMS, F.C.S.; 1884-5, J. B. STEPHENSON; 1885-6, T. GREENISH, F.C.S.; 1886-7, S. R. ATKINS, J.P.; 1887-8, F. B. BENDER, F.I.C., F.C.S.; 1888-9, 1889-90, C. UMNEY, F.I.C., F.C.S.; 1890-91, W. MARTINDALE, F.C.S.; 1891-2, E. C. C. STANFORD, F.I.C., F.C.S.; 1892-3, O. CORDER. 1893-4, N. H. MARTIN, F.L.S., F.R.M.S.

THE YEAR-BOOK OF PHARMACY AND TRANSACTIONS.

The Conference annually presents to members a handsome octavo volume of about 600 pages, containing the proceedings at the yearly meeting, and a report on the progress of pharmacy, or Year-Book, comprising abstracts of papers on pharmacy, materia medica, and chemistry, and on new preparations, processes, and formulae, published at home and abroad during each year. The funds of the Conference, composed of annual subscriptions of seven shillings and sixpence, are devoted to the production of this useful book, no pains being spared to make it the desk companion of the year, and an invaluable permanent work of reference for every chemist and druggist. The Executive Committee of the Conference trusts that members will show the current Year-Book to their friends and acquaintances—principals, assistants, or pupils—and obtain as large a number of new members as possible. An alphabetical list of the names and addresses of subscribers will be found in each Year-Book.

NOMINATION FOR MEMBERSHIP.

Gentlemen desiring to join the Conference can be nominated at any time on applying to a Secretary or any other Officer or member. The Name and Address of each candidate should be written legibly, and forwarded to "The Asst. Secretary," British Pharmaceutical Conference, 17, Bloomsbury Square, London, W.C., together with the subscription.

THE ANNUAL SUBSCRIPTION.

The Conference year commences on July 1st, and Annual Subscriptions are due in advance on that date. The amount, which includes free delivery of the Year-Book, is 7s. 6d. for members residing within the Postal Union. Remittances may be made by Postal or Post Office Order, crossed " & Co.," made payable to the British Pharmaceutical Conference, at the "High Holborn" Post Office, or by Cheque, and should be addressed as follows: "The Asst. Secretary, Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C." To all members who have previously paid the Annual Subscription, the Year-Book, including Transactions, is posted as soon as published in December, and extra copies of the Year-Book and Transactions for 1870 and subsequent issues, will be sent to members on receipt of Subscription as above, for each additional copy. To non-members, the price is Ten Shillings per volume, exclusive of postage.

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RELATING TO

PHARMACY, MATERIA MEDICA, AND CHEMISTRY

CONTRIBUTED TO BRITISH AND FOREIGN JOURNALS,

FROM JULY 1, 1892, TO JUNE 30,

1893.

WITH THE

TRANSACTIONS

OF THE

BRITISH PHARMACEUTICAL
CONFERENCE

AT THE

THIRTIETH ANNUAL MEETING

HELD AT

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AUGUST, 1893.

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BRITISH PHARMACEUTICAL CONFERENCE.

INAUGURAL MEETING HELD AT NEWCASTLE-ON-TYNE IN 1863.

Years.	Places of Meeting.	Presidents.	Vice-Presidents (Four).	Local Secretaries (One).
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1866	Nottingham	Prof. BENTLEY, F.L.S. . .	{ Dr. EDWARDS, F.C.S. { D. HANBURY, F.R.S.	J. H. ATHERTON, F.C.S.
1867	Dundee . .	Prof. BENTLEY, F.L.S. . .	{ D. HANBURY, F.R.S. { J. INCE, F.L.S.	J. HODGE.
1868	Norwich . .	DANIEL HANBURY, F.R.S.	{ R. FITCH, F.G.S. { J. INCE, F.L.S.	F. SUTTON, F.C.S.
1869	Exeter . .	DANIEL HANBURY, F.R.S.	{ G. COOPER { H. S. EVANS, F.C.S.	M. HUSBAND.
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1873	Bradford . .	H. B. BRADY, F.R.S. . .	{ T. H. HILLS, F.C.S. { R. REYNOLDS, F.C.S.	R. PARKINSON, Ph.D.
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THE BRITISH PHARMACEUTICAL CONFERENCE.

AN ORGANIZATION ESTABLISHED IN 1863 FOR THE ENCOURAGEMENT OF PHARMACEUTICAL RESEARCH, AND THE PROMOTION OF FRIENDLY INTERCOURSE AND UNION AMONGST PHARMACISTS.

THE most important ways in which a member can aid the objects of the Conference are by suggesting subjects for investigation, working upon subjects suggested by himself or by others, contributing information tending to throw light on questions relating to adulterations and impurities, or collecting and forwarding specimens whose examination would afford similar information. Personal attendance at the yearly gatherings, or the mere payment of the annual subscription, will also greatly strengthen the hands of the executive.

A list of subjects suggested for research is sent to members early in the year. Resulting papers are read at the annual meeting of the members; but new facts that are discovered during an investigation may be at once published by an author at a meeting of a scientific society, or in a scientific journal, or in any other way he may desire; in that case, he is expected to send a short report on the subject to the Conference.

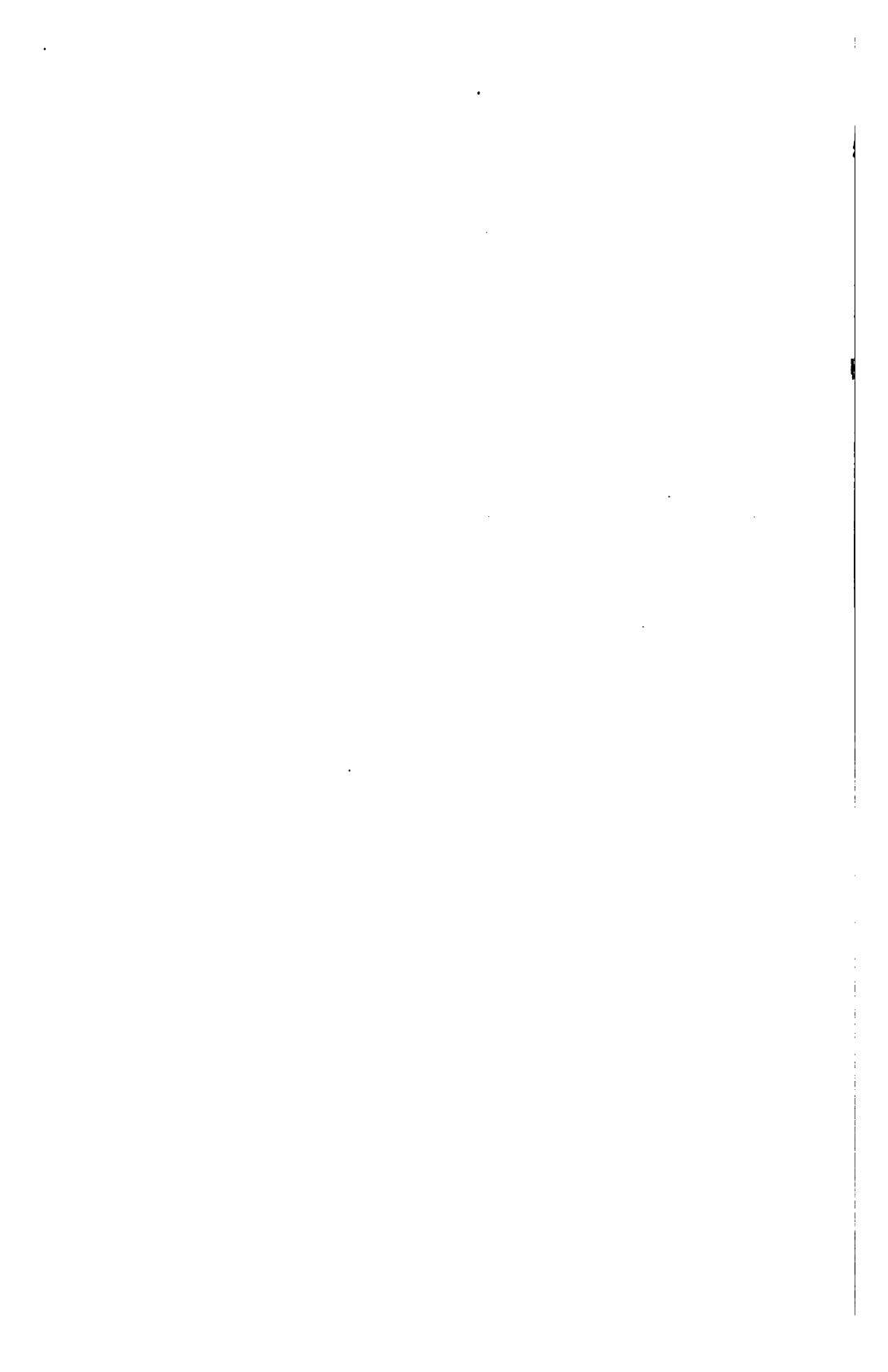
The annual meetings are usually held in the provinces, at the time and place of the visit of the British Association; that for 1894 will be held at Oxford.

Gentlemen desiring to join the Conference can be nominated at any time on applying to the Secretary, or any other officer or member. The yearly subscription is payable in advance, on July 1st. The amount, which includes free delivery of the Year-Book, is 7s. 6d. for members residing within the Postal Union. Further information may be obtained from

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THE YEAR-BOOK OF PHARMACY.

The Conference annually presents to members a volume of about 600 pages, containing the proceedings at the yearly meeting, and an Annual Report on the Progress of Pharmacy, or Year-Book, which includes notices of all pharmaceutical papers, new processes, preparations, and formulæ published throughout the world. The necessary fund for accomplishing this object consists solely of the subscriptions of members. The Executive Committee, therefore, call on every pharmacist—principal, assistant, or pupil—to offer his name for election, and on every member to make an effort to obtain more members. The price of the Year-Book to non-members is ten shillings. The constitution and rules of the Conference, and a convenient form of nomination, will be found at page 259.



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INTRODUCTION.

In accordance with the custom of former years, we again devote the introductory pages of this work to a brief review of its chief

ERRATA.

Page 54, line 33, *for combination read confirmation.*

„ 120, last line, *for Nos. 2, 3, 4, and 5 read Nos. 3, 4, and 5.*

„ 136, line 40, *for reducing read producing.*

„ 152, line 34, *before Phyllanthus insert those ascribed by Dymock to.*

In the Volume for 1892 :

Page 160, line 32, *for Diuretic read Dietetic.*

pure crystalline base should be used in experiments. The amorphous alkaloids, aconine and isaconitine, have been isolated in a pure condition, and their properties and composition investigated. Isaconitine, which is regarded as a new base, entirely different from the variable mixture of amorphous alkaloids described by earlier workers under the name of napelline, is found to occur in aconite root to as large an extent as aconitine, and to be the chief base present in the aconitine salts of commerce. While differing essentially from aconitine in its chemical constitution and physiological activity, it proves to be isomeric with the latter base, to be readily obtainable from it, and to agree with it in yielding aconine and benzoic acid on hydrolysis. It will be evident from the last-named observation that the propor-



INTRODUCTION.

IN accordance with the custom of former years, we again devote the introductory pages of this work to a brief review of its chief contents as far as this is practicable within the space reasonably admissible in a prefatory chapter. The reader will find that the past year has been productive of numerous additions to the store of pharmaceutical knowledge, both as regards new investigations and the further prosecution of researches already in progress. Among the more important work of the latter class, we may refer, in the first place, to four additional contributions to the chemistry of the aconite alkaloids, by W. R. Dunstan, in conjunction with E. F. Harrison, F. H. Carr, and H. A. D. Jowett. In these it is shown that pure crystalline aconitine, a highly toxic base of definite and invariable composition, and capable of producing constant therapeutic effects, is associated in *Aconitum Napellus* with at least three amorphous and much less poisonous alkaloids, viz. aconine, isaconitine, and homoisaconitine, which constitute at least 75 per cent. of the total bases, and occur likewise to a very large extent in many commercial specimens of aconitine. It is therefore considered most important that in future none but the pure crystalline base should be used in medicine. Two of the amorphous alkaloids, aconine and isaconitine, have been isolated in a pure condition, and their properties and composition investigated. Isaconitine, which is regarded as a new base, entirely different from the variable mixture of amorphous alkaloids described by earlier workers under the name of napelline, is found to occur in aconite root to as large an extent as aconitine, and to be the chief base present in the aconitine salts of commerce. While differing essentially from aconitine in its chemical constitution and physiological activity, it proves to be isomeric with the latter base, to be readily obtainable from it, and to agree with it in yielding aconine and benzoic acid on hydrolysis. It will be evident from the last-named observation that the propor-

tion of benzoic acid formed in the hydrolysis of aconitine cannot serve as a satisfactory basis of any process for the quantitative estimation of this alkaloid. The hydrolytic conversion of aconitine into aconine and benzoic acid has also been investigated by A. Ehrenberg and C. Purfürst, who arrive at the conclusion that this decomposition is not quite so simple as is generally represented, but that there is at least one intermediate product formed, which is described by them as a new alkaloid. Re-determinations of the composition of pure aconitine by the same chemists induce them to adopt the formula $C_{32}H_{43}NO_{11}$, which differs somewhat from those found by Wright and Luff, and by Dunstan and Umney.

Recent contributions to the literature of solanaceous alkaloids do not remove the doubt cast on the existence of hyoscyne, $C_{17}H_{23}NO_3$, as a distinct base. A. Ladenburg, while admitting the occurrence of scopolamine in commercial hyoscyne, disputes the supposed identity of these two bodies on the strength of analytical results and crystallographic measurements. On the other hand, E. Schmidt repeats his assertion that the commercial hyoscyne preparations examined by him, and supplied to him as salts of Ladenburg's hyoscyne, not merely contain, but consist essentially of salts of scopolamine; but he does not for the present deal with the question whether or not such a body as hyoscyne of the formula $C_{17}H_{23}NO_3$ may after all occur in henbane or other solanaceous plants. O. Hesse, like E. Schmidt, finds the composition of hyoscyne to correspond to the formula $C_{17}H_{21}NO_4$, which exactly coincides with that of scopolamine. The identity of Hesse's atropamine with apatropine is again asserted by E. Merck, who also reports the isolation of a new alkaloid, *pseudohyoscyamine*, from *Duboisia myoporoides*.

Additional information is supplied by T. and H. Smith and Co. respecting the two hitherto but little known opium alkaloids *xanthaline* and *gnoscopine*, originally discovered in 1881 and 1878 respectively. The composition of the former is represented by the formula $C_{37}H_{36}N_2O_9$, and that of the latter by $C_{23}H_{23}NO_7$; both are stated to give characteristic colour reactions. Gnoscopine is found to be isomeric, but not identical with narcotine, and to be obtainable from the latter, the product of this conversion being perfectly identical with the base obtained direct from opium. Codeine has been further investigated by M. Göhlich, and laudanine by G. Goldschmiedt, who points out that this body is isomeric with tetrahydropapaverine, and represents its constitution by the

formula $C_{17}H_{15}N(O Me)_3 O H$. Reports on strychnine by J. Tafel deal with crystalline acid products obtained in the oxidation of this alkaloid by means of nitric acid, and indicate a close analogy of some of these products with derivatives of tetrahydroquinoline. The study of derivatives of the cinchona alkaloids has been continued by A. Claus and by W. J. Comstock, with the view of obtaining further light respecting the constitution of these bodies. A number of quinine double salts are described by E. Grimaux, and some bases homologous with quinine by the same author in conjunction with A. Arnaud. Apocinchonine and diapocinchonine, the basic products obtained in the action of hydrochloric acid on cinchonine, have been investigated by E. Jungfleisch and E. Leger, who arrive at the conclusion that the latter body is not a chemical compound, but a mixture of alkaloids among which cinchoniline and cinchonigine have been recognised. O. Hesse furnishes some interesting information on cincholine, a volatile base hitherto supposed to be a constituent of cinchona bark. He shows that this product does not occur in that bark at all, but emanates from the hydrocarbon oil employed as a solvent in the course of the preparation of the ordinary cinchona alkaloids. A similar observation is recorded by the same author with regard to fluoroline, formerly known as hygrine, which is now found not to be a constituent of coca leaves, but to originate from the oil used in the extraction of cocaine. It is a homologue of quinoline, while cincholine is allied to the piperidine bases and homologous with coniine. The same chemist also publishes the results of a further investigation of benzoylpseudotropeine (tropacocaine), a coca base previously described by Giesel and Liebermann, and recently reported upon most favourably as a local anæsthetic possessing decided advantages over cocaine. The existence of caffeine salts as definite chemical compounds receives additional corroboration from a research by E. Schmidt, and the evidence, already overwhelming respecting the identity of caffeine and theine, is still further augmented by W. R. Dunstan and W. F. J. Shephard. The perfect identity of ulexine, from *Ulex Europæus*, with cytisine, the alkaloid of laburnum, is proved once more by A. Partheil. A comparison, by G. Nothnagel, of natural muscarine, from the fly agaric, with the artificial base obtained from choline, shows these two bodies to be alike in their physical and chemical properties, but to differ somewhat in their physiological action. The constitution of nicotine has received the attention of A. Pinner, R. Wolfenstein, and F. Blau. Among other alkaloids which have recently

formed subjects of further chemical research may be mentioned piperidine, carpaine (from *Carica Papaya*), hydrastine, berberine, pseudopelletierine, and the sabadilla bases.

A further report on the glucosides of digitalis, and more especially on the different kinds of digitalin met with in commerce, is published by H. Kiliani, and is calculated to assist in clearing away some of the confusion still existing with regard to this subject. According to this author, "crystallized digitalin" consists mainly of digitonin, while Schmiedeberg's digitalin, which is now offered in commerce in a pure state under the name of "*digitalinum verum*," is a chemical principle of marked individuality, and perfectly constant in its action. Cerberin, a poisonous glucoside from a species of *Cerbera*, an East Indian plant belonging to the *Apocynaceæ*, is described by P. C. Plugge, and stated to resemble digitalin in its physiological action. The resinous glucosides of *Convolvulus Scammonia* and *Ipomœa Turpethum* are discussed by N. Kromer. Some interesting light is thrown on the chemical relation between resins and tannins by E. Heckel and F. Schlagdenhauffen, who have obtained from species of *Gardenia*, *Spermolepis* and *Garcinia*, resinous constituents showing such an analogy to members of the group of tannins, as to form, so to say, connecting links or transitions between the two classes of compounds, and to allow of the supposition of a community of origin. The tannins of chestnut and canaigre are dealt with by H. Trimble and J. C. Peacock, while a useful summary of the numerous plants yielding tanning materials is furnished by F. E. Mafat. A. Hilger confirms E. Knebel's observation respecting the presence in kola nut of a glucoside yielding, on decomposition, caffeine, glucose, and kola red, and further shows that the theobromine, caffeine, cacao red, and glucose obtainable from cacao beans are likewise decomposition products of a glucoside.

A new method for the purification of chloroform is suggested by R. Anschütz, and appears to be both simple and efficient. It is based on the observation that salicylide, when treated with commercial chloroform, produces a crystalline compound containing none of the impurities of the latter, and yielding perfectly pure chloroform on the application of gentle heat. The residual salicylide can be used over and over again in the same manner. It is pointed out, moreover, that the crystalline compound alluded to, if protected against air and heat, possesses great stability, and may be used at any time for the rapid and convenient preparation of absolutely pure chloroform for immediate use. The nature of

the products formed during the spontaneous decomposition of chloroform have been re-investigated by D. Brown, as well as by C. Schacht and E. Biltz, and the successive changes occurring in this decomposition expressed by definite equations. Attention is also called by the first-named of these chemists to the observation that in an atmosphere of pure oxygen the decomposition of chloroform is greatly accelerated, whereas in a vacuum it can be entirely checked, even under the prolonged influence of light. The difficulty of preparing pure ether in large quantities of as low a specific gravity as $\cdot 720$ is referred to by D. B. Dott, whose results indicate that commercial specimens of so-called pure ether of low specific gravity owe the latter mostly to the presence of methyl ether. C. O. Curtman has examined a number of commercial samples of amyl nitrite, which he finds to vary in strength from 27.1 to 93.7 per cent. He regards the specific gravity and boiling point of this preparation as insufficient data for judging its purity.

The body known as hydrogen nitride, azoimide, nitrohydric acid, or hydrazoic acid, which has absorbed so much interest during the last few years on account of its remarkable properties has now been synthetically prepared by W. Wislicenus. The process adopted for this purpose consists in heating sodium in ammonia gas, and converting the resulting sodamide, Na N H_2 , into sodium nitride, Na N_3 , by the action of nitrous oxide. The product of this reaction, when dissolved in water and distilled with dilute sulphuric acid, readily yields a solution of hydrogen nitride, H N_3 . The well-known accelerating action of manganese dioxide on the decomposition of potassium chlorate by heat is regarded by C. W. Faulkner as due to the increase of the exposed surface of the latter, since sand is found to exercise the same influence on this decomposition as manganese dioxide. The interaction of potassium chlorate and iodine is shown by T. E. Thorpe and G. H. Perry to consist in the main in a simple interchange of chlorine and iodine, the products being potassium iodate and free chlorine. The reaction between solutions of nitrites and potassium ferrocyanide in the presence of acetic acid, pointed out long ago by Schäffer, has been further studied by C. M. van Deventer, and found to be applicable for the preparation of nitric oxide, as well as for the detection and estimation of nitrous acid. E. v. Meyer's observation as to errors arising in analytical operations owing to the employment of gas flames and the consequent formation of sulphuric acid is confirmed by A. Lieben and E. Priwoznik. The fact that commercial specimens of reduced iron are generally very impure is attributed by T.

Appel to the use of impure hydrogen gas, since he has ascertained that the same process which yields a preparation containing 99·7 per cent. of pure metallic iron when hydrogen in a thoroughly pure condition is employed, gives a product containing only about 58 per cent. when the purification of the gas is omitted. G. C. Schmidt has investigated the action of nitric acid on potassium bichromate, and has satisfied himself that potassium tetrachromate is the only product formed in this process, and that the compounds described by Darmstädter are mixtures of potassium nitrate and tetrachromate. An improved method for the preparation of pure strontium salts is recommended by L. Barthe and M. Falières, and may be of interest to pharmacists on account of the increasing use of these salts as therapeutic agents. The merits of animal charcoal as a decolorizer are discussed by both T. R. Carswell and D. B. Dott, the former of whom regards this property as one not inherent in pure carbon as such, but as due to the physical condition of the charcoal, and more especially to its mineral constituents; while the latter, though partially agreeing with these conclusions, points out that there are certain colouring compounds which are much better removed by the purified than by the crude charcoal, and that there are instances in which the crude preparation is not admissible on account of the carbonates contained in it.

The results of experiments conducted by C. W. Earle on the sterilization of milk at the boiling-point of water lend support to the opinion expressed by A. R. Leeds and E. P. Davis, that this treatment is objectionable on the ground that it lessens the digestibility and nutritive value of the milk. This subject, however, seems to require further investigation, since H. Drouet, in a report presented to the Paris Academy of Medicine, arrives at entirely different conclusions. A study of the composition and physiological chemistry of koumiss leads G. Sharp to infer that this preparation is a more complex fluid than is generally supposed. Processes for the manufacture of koumiss, and of medicinal preparations of this product, are suggested by D. H. Davies. A report on albumoses and peptone by W. Kühne deals chiefly with the separation of these bodies by means of ammonium sulphate, and with the conditions requiring to be observed to ensure success in this operation. A digestive ferment has been recognised by J. R. Green in the fruit of *Cucumis utilisissimus*, and is described by him as similar to papain in its action on coagulated egg albumen. M. Arthus and A. Huber record the interesting observation that a weak solution of sodium fluoride possesses the

power of definitely arresting fermentations due to the development of living organisms, while exercising no disturbing influence on chemical fermentations, and that a sharp line of demarcation can thus be drawn between these two kinds of fermentative processes. The application of fluorides as anti-fermentatives also forms the subject of a report by S. Baekeland, who arrives at similar conclusions.

A. A. Kautback has investigated the chemical nature of cobra poison, which he finds to be an albumose closely resembling protoalbumose in its properties. He does not share the favourable view entertained by A. Calmette respecting the value of hypodermic injections of gold chloride for arresting the action of this venom, and regards strychnine as entirely useless as an antidote. A toxic substance resembling the ptomaines, and more especially neurine, has been isolated by Adamkiewicz from cancerous tissue, and is described by him under the name of *cancroin*. A valuable review of the work hitherto done in the chemical examination of bacterial poisons is published by W. Simon. Characteristic ptomaines have been obtained by A. B. Griffiths from the urine of victims to glanders, pneumonia, erysipelas, puerperal fever and eczema, and a new leucomaine from the urine of an epileptic patient. All these bodies are found to be toxic, and not to occur in normal urine.

The value of a test for the detection of typhoid in its earlier stages by means of a colour reaction of the patient's urine with sulphanilic acid, described by Ehrlich, is called in question by G. M. Beringer, on the ground that phenol, peptone, and other bodies capable of producing this reaction, may be present in the urine from other causes. The occurrence of hæmatoporphyrin in urine, which is now so often observed on account of the extensive medicinal use of sulphonol, does certainly not appear to be due, in every instance, to the administration of this remedy, since it has recently been observed by A. E. Garrod and by M. Sobernheim in other cases, and is stated to be normally present in small traces, even in healthy urine. A. Geyger shows that the results of the titration of sugar in diabetic urine may be seriously impaired by the presence of glycosuric acid. V. Harley expresses his concurrence in Lépine's view, that the sugar in the urine of patients suffering from certain forms of diabetes is due to the absence of a glycolytic ferment in the circulation. A five per cent. solution of chromic acid is recommended by O. Rosenbach as a good reagent for the detection in urine of both albumen and bile pigments. Attention is called

by E. Gérard to the important observation that, under the influence of milk diet, patients suffering from Bright's disease may pass urine comparatively free from albumen, and containing protopeptone in its place, the latter of which may escape observation by the usual tests for albumen. It is necessary, therefore, to test the urine in such cases for protopeptone, in order to avoid fallacious conclusions. The principal processes in use for the estimation of uric acid have been critically examined by H. C. Geelmuyden and by E. Deroide, with results indicating that an accurate method for this determination is still a desideratum.

J. Clark proposes some improvements in Reinsch's test for arsenic, having for their object the identification of arsenic or antimony on the copper with greater certainty, and the quantitative estimation of both these elements when they occur together. For this purpose the coated copper is digested in a cold, weak solution of caustic potash and peroxide of hydrogen, the resulting liquid boiled, filtered, concentrated by evaporation, then distilled with ferrous chloride and strong hydrochloric acid, and the arsenic estimated in the distillate as sulphide, while the antimony is determined in the residue. A convenient method for the detection and estimation of minute quantities of lead in the presence of copper and iron is suggested by F. L. Teed, and stated to be specially suited to the examination of lemonade and similar beverages. It consists in the application of ammonium sulphide preceded by tartaric acid, ammonia, and a small quantity of potassium cyanide. The separation of barium from strontium and calcium by Rose's method is found by E. Kouklin to give correct results if the potassium sulphate and carbonate are used in the proportion of five parts of the former to one of the latter. The quantitative separation and estimation of chlorides, bromides, and iodides is effected by C. Friedheim and R. J. Meyer by boiling the acid solution first with potassium arsenate to expel the iodine, and then with potassium bichromate in order to remove the bromine. The elements thus liberated are received separately in potassium iodide solution, and the free iodine determined in each case by titration with sodium hyposulphite. Of the various methods for the assay of alkaline nitrites, G. Lunge prefers a modification of the permanganate process as the most accurate, simple, and expeditious. A standardized solution of barium chromate in hydrochloric acid is recommended by E. Stolle for the titration of sulphuric acid in soluble sulphates. For the determination of alkaline sulphates, C. Cherix suggests the precipita-

tion with barium hydrate, followed by the removal of the excess of the latter by means of carbonic anhydride and the estimation of the alkaline carbonate in the filtrate by titration in the usual way. In the determination of phosphoric acid by means of ammonium molybdate, the presence of arsenic acid is shown by H. C. Babbitt to have no disturbing effect, provided the temperature of precipitation does not exceed 25° C. A new method for the titration of tannic and gallic acids with a standard solution of copper sulphate is suggested by W. P. Dreaper. The detection of atropine in poisoning cases is stated by L. Fabris to be rendered much more difficult by the simultaneous presence of strychnine, which seems to obscure its chemical reactions. The delicacy of the bichromate test for strychnine is found by H. Beckurts to be much impaired by the presence of a large proportion of brucine. A new colour reaction of cocaine is described by A. Kuborne. The analysis of quinine sulphate and the determination of quinine in presence of other cinchona bases have engaged the attention of L. Barthe, while the estimation of this alkaloid in cinchona barks forms the subject of an essay by J. H. Schmidt.

The official process and its modifications for the assay of jalap root are adversely criticised by F. H. Alcock, who recommends in their place a method based on the great solubility of jalap resin in amyl alcohol, and the comparatively slight solubility of this alcohol in water. G. Kottmayer has examined the various methods in use for the assay of ipecacuanha, the majority of which he finds to give low results. He describes the details of a new method for which he claims greater accuracy. Another new process for the same purpose is suggested by C. C. Keller, who disagrees with the statement published by Cæsar and Loretz that the best qualities of ipecacuanha root do not contain more than 1.85 per cent. of emetine, and concludes that a standard of 2.5 per cent. would not be too exacting. Recent observations by A. A. Kanthack and R. Caddy seem to justify the conclusion that the anti-dysenteric value of this drug does not depend upon the emetine present in it, and that ipecacuanha freed from this alkaloid is likely to prove a very satisfactory remedy in cases of acute dysentery, in which the depression and nausea so often produced by even small doses of the ordinary root are a decided disadvantage. A suitable process for the preparation of such a product is described by F. C. J. Bird in a communication to the recent meeting of the British Pharmaceutical Conference. Attention is directed by E. M. Holmes to the varieties and qualities of

commercial ipecacuanha, to the distinguishing features between the genuine and spurious specimens, and to the difficulty of detecting the latter in the powdered drug. The same author refers to the present difficulty of obtaining strophanthus seed of uniform character agreeing with the official description, and discusses the various species the seeds of which are found to occur in the commercial drug. He likewise gives a summary of the present state of knowledge respecting cubebs and their substitutes met with in commerce. The results of an examination of the false cubebs derived from *Piper ribesioides* and their constituents are reported by E. Brooke. A spurious drug substituted for bikhma (the Indian name for *Aconitum palmatum*) is described by C. J. H. Warden and C. L. Bose, who think that it may possibly be derived from *Acanthophyllum macrodon* or *Gypsophila paniculata*. A fictitious kamala recently occurring in the market is referred to by H. G. Greenish, and shown to consist chiefly of coarsely powdered safflower.

The "earth sugar" root of the Tamils, which has been known in Southern India for centuries, and has been employed as an alterative, stimulant, tonic, and as a remedy for skin diseases, is reported upon by D. Hooper, whose results do not warrant the conclusion that it possesses much real medicinal value. According to M. A. Lawson, it is the produce of *Mærua arenaria*, belonging to the natural order *Capparidæ*. Y. Shimoyama and K. Hyrano have examined the root of *Valeriana angustifolia*, a Japanese variety differing but slightly from *V. officinalis*, and yielding a somewhat larger proportion of volatile oil. In a preliminary report on coto bark, contributed to the recent meeting of the British Pharmaceutical Conference, W. Elborne shows that, in addition to the true Bolivian coto and the drug known as paracoto bark, a so-called coto-bark from Venezuela is met with in commerce, which proves to be the bark of *Drimys Winteri*, var. *granatensis*, and to contain an active principle closely analogous to, if not identical with, true cotoin. E. M. Holmes gives a description of the distinctive features of Pernambuco jaborandi, *Pilocarpus Jaborandi*, the leaves of which are known to yield more alkaloid than those of the Paraguay plant, *Pilocarpus pennatifolius*, and ought therefore to be preferred to the latter. An examination by O. Stapf of the mucilaginous seeds referred to by Dymock (Veget. Mat. Med. of Western India, 2nd ed., p. 703) as the produce of *Phyllanthus maderaspatensis*, reveals their identity with a Persian drug known as "marv," consisting of the nutlets of *Salvia spinosa*. An exudation from the incised

trunk of *Laurus giganteus* is described by T. Bayón under the name of Caparrapi balsam, and stated to be employed in Columbia as a stimulant in chronic catarrhal affections. Some further information respecting the characters of African copaiba is supplied by J. C. Umney. An African kino is reported upon by A. W. Southall and E. M. Holmes, some Australian kinos by J. H. Maiden, and several Australian gums and gum-resins by the same author. The latter also gives an account of a manna obtained from *Myoporum platycarpum*, showing this drug to be practically identical with the product of *Fraxinus Ornus*. B. H. Paul and A. J. Cownley have examined a sample of the Patna opium issued by the Medical Store Department of Bengal for medicinal use. They find it to contain 8.5 per cent. of morphine, and to yield a very satisfactory tincture. Four samples of Japanese opium, obtained from the province of Mije, and analyzed by M. Uyeno, are stated to contain from 10 to 12.9 per cent. of morphine, associated with a high percentage of narcotine. An interesting report is published by L. Wray, junr., on the Malayan fish poison, called *Aker tuba*, which has been previously referred to by Greshoff under the name of "derrid." It is the root of a papilionaceous woody climber, *Derris elliptica*, and is shown to owe its very remarkable effects to a resinous principle, "tubaïn," of which one part is sufficient to render one million parts of water poisonous to fish. The literature of arrow poisons has received further contributions from E. M. Holmes, S. Eldridge, and T. R. Fraser and J. Tillie.

The alleged efficacy of bilberry leaves as a remedy in diabetes appears to be based on erroneous observations, the urine in the favourable cases reported upon having been tested by the optical method only. F. v Oefeles points out that during the treatment with this drug the indications of the polariscope are fallacious, as the arbutin contained in the leaves renders the urine lævo-rotatory, and thus counteracts the dextro-rotatory action of the glucose. It may here be mentioned that, according to A. Jolles, the claim of benzozol (benzoylguaiacol) as a successful remedy for diabetes is open to doubt on precisely the same grounds. The leaves of *Urechites suberecta*, an apocynaceous plant indigenous to the West Indian islands, have been investigated by R. Stockman, who reports that the two bitter glucosides contained in them are heart poisons similar in their action to digitalin, but possessing the disadvantage of producing cumulative effects in so high a degree as to render it improbable that this plant will prove of much value as a cardiac tonic. The opinion that the toxicity of the yew is

confined to the male plant receives support from an observation by F. J. M. Stuart Wortley to the effect that taxine is present in the male and absent in the female yew. R. Kobert argues against the administration of sarsaparilla in conjunction with mercurial preparations capable of causing lesions in the intestinal membranes, on the ground that the glucosides of this drug, though harmless when administered under ordinary conditions, have a poisonous action when introduced into the blood or absorbed by injured membranes. The anthelmintic action of male fern and of the fixed oil extracted from it is shown by the same author to be due to the volatile oil contained in both as well as to the presence of filicic acid. Tannic properties are attributed by J. Stephens to cascara sagrada given in doses of $2\frac{1}{2}$ grams of the fluid extract. The value of the cowberry plant, *Vaccinium vitis-idaea*, in the treatment of chronic rheumatism is confirmed by M. Smirnoff. *Aplopappus clareta*, a Chilian plant, is very favourably reported upon as a remedy for gonorrhœa and gleet. *Morrenia brachystephana*, a plant belonging to the *Asclepiadaceæ*, and growing in the Argentine Republic, is reported by Del Arca and Sicardi to be an excellent galactagogue. The galactagogue properties of goat's rue (*Gallega officinalis*), nettle, cumin, anise and fennel are discussed by Miss Griniewitch. *Paris quadrifolia* has recently been reinvestigated, and is stated to act on the respiratory centres and the muscular system in a manner similar to curare, and to resemble Calabar bean in its action on the pupil of the eye. In other respects its action is compared with that of aconite. *Teucrium Scordium*, applied hypodermically in the form of an alcoholic extract obtained from an aqueous extract of the dried plant, is reported by Mosetig-Moorhof to be a valuable remedy in the treatment of local fungoid diseases and abscesses. The power of *Anagallis arvensis* to destroy fleshy growths and horny warts by local applications is attributed by G. Daccommo and D. Tommasi to the presence of a ferment analogous in its action to pepsin.

The root of *Corydalis cava* has been reinvestigated with regard to its constituents by M. Freund and W. Josephy, whose results show that the basic constituent of this drug, known in commerce as "corydaline," consists of three distinct alkaloids, which are described by them under the names of *corydaline*, *bulbocapnine*, and *corycavine* respectively. No fewer than six distinct bases have been recognised by E. Birsmann in the root of *Corydalis nobilis*, which, in addition to these, has also afforded indications of the presence of berberine and hydroberberine. The root of *Rauwolfia*

serpentina has yielded to C. J. H. Warden and C. L. Bose a new alkaloid for which, pending further researches, they propose the name *pseudobrucine*, on account of its resemblance to brucine. From the root of *Ipomœa Pandurata*, which is employed in America as a remedy for calculus, M. Kromer has obtained a glucoside differing from those obtained in other *Convolvulaceæ*. The aerial tubers of *Dioscorea bulbifera* procured from the Gaboon country of Central Africa are found by Heckel and Schlagdenhauffen to contain a bitter poisonous glucoside, while the underground tubers are entirely free from this toxic principle. An analysis by F. W. Meink of the tubers of *Dioscorea Batatas*, a species indigenous to Central Asia, likewise shows the presence of a glucoside, but whether this also possesses poisonous properties remains yet to be ascertained. An investigation of the bark of *Rhamnus Purshiana* by M. Leprince has led to the isolation of a crystalline constituent of the composition $C_{12}H_{10}O_5$, which he regards as the active principle, and for which the name cascarn is suggested. According to a subsequent research by T. L. Phipson this principle appears to be identical with rhamnoxanthin obtained from the bark of *Rhamnus Frangula*. *Cephalanthus* bark has been examined by C. Mohrberg, and found to contain, in addition to tannin and a saponin, a feebly acid, toxic, and very bitter principle of the composition $C_{22}H_{31}O_6$. The bark of *Laurelia aromatica* is shown by O. Witte to contain an alkaloid similar in its reactions to atherspermine, and also to boldine. In the common nettle the presence of a crystalline alkaloid acting as a poison on the lower animals has been discovered by Oddi and Lomonaco. A toxic base, associated with two resinous principles, has been obtained from jurubeba (*Solanum paniculatum*) by D. Freire. The results of a proximate analysis of the leaves of *Andromeda Mariana* by A. W. Dowd reveal the presence of a glucoside apparently identical with the andromedotoxin occurring in other poisonous plants of the order *Ericaceæ*. A glucosidal principle has also been found to exist in *Verbena urticifolia*, the leaves of which have acquired some reputation in the United States as a tonic. F. Schlagdenhauffen and E. Reeb have continued their researches on the constituents of Dalmatian insect powder, and report upon an essential oil and two toxic acid principles. Myrobalans, the fruit of *Terminalia chebula* and other species, which are well known to yield a large proportion of tannin, are stated by W. Adolphi to contain in addition a characteristic constituent of the composition $C_{28}H_{24}O_{19} + H_2O$, for which the name *chebuling acid* is suggested. We have

to forego notices of numerous other vegetable drugs, which have likewise been investigated or reinvestigated during the year.

Confirmatory evidence is furnished, both by J. Brissonnet and M. Chaumier, of the value of guaiacol carbonate in the treatment of pulmonary phthisis, and of the advantages it possesses over guaiacol. An equally or even still [more favourable opinion is expressed with regard to the merits of the corresponding compound of creasote, which is described under the name "creosotal," and is stated to split up in the intestines into carbonic acid and creasote, thus producing the action of the latter without interfering with the digestive process. Benzol, administered in small doses, is recommended by W. Murrell as a very useful expectorant and sedative in chronic bronchitis and winter cough. Asbolin, a substance obtained from an aqueous infusion of soot, and introduced as a remedial agent in tuberculosis, is found by A. Béhal and M. Desvignes to consist of a mixture of pyrocatechin and homopyrocatechin. Pangaduine, a preparation from cod-liver oil, consisting of a mixture of all the alkaloids contained in this oil, is described by J. Bouillot, and stated to be of great value in tuberculosis, gout, rheumatism, diabetes, and neurasthenic weakness. A combination of cantharidin with cocaine is referred to by M. Hennig as a product possessing notable therapeutic advantages over the cantharidates in the treatment of pulmonary tuberculosis and chronic catarrhal affections of the respiratory passages. Under the commercial name "salocoll," phenocoll salicylate is recommended in the place of the hydrochlorate as an antipyretic, antineuralgic, and antirheumatic. Agathin, another new remedy for neuralgia and rheumatism, is stated to be a salicyl- α -methyl-phenylhydrazone. Two more synthetical remedies, which have recently been added to the list of antipyretics, are "tolypyrine" and "tolysal," of which the former differs from antipyrine by containing an additional methyl group introduced into the phenyl radical, while the latter is a combination of tolpyrpyrine with salicylic acid. A compound of sodium salicylate and narceine sodium, named "antispasmin," is described by E. Merck as an excellent hypnotic and sedative, containing the narceine in a very pure and soluble form. The name "chloralose" is applied by M. Hanriot and C. Richet to a new hypnotic, resulting from the combination of chloral and glucose, which is stated to be superior in its action to chloral, and less likely to produce injurious effects. The body reported upon as butyl-hypnal by M. Bernin is a combination of butyl-chloral with antipyrine. Formanilid is credited

with anæsthetic, analgetic, antineuralgic, and hæmostatic properties. A preparation introduced under the name "coryl" as a local anæsthetic in dentistry and minor surgical operations, is a mixture of methyl and ethyl chloride. Eugenol-acetamide is found to be equal to cocaine as a local anæsthetic, and to combine with this effect a powerful antiseptic action. Encalypteol, a crystalline dihydrochloride obtained in the action of hydrochloric acid on eucalyptus oil, is recommended by M. Anthoine as a useful internal antiseptic, and the same property is claimed for sodium paracresotate by Demme and Lœsch. Diaphterin (oxyquinaseptol), which is formed by the introduction of a second molecule of oxyquinoline into oxyquinoline phenol sulphate, is reported to be a valuable and comparatively non-poisonous antiseptic, the aqueous solution of which is very suitable for dressings. The aluminium compounds of paraphenolsulphonic acid and naphtholsulphonic acid are described under the names "sozal" and "alumol" respectively, as useful astringent antiseptics. The powerful antiseptic action of formic aldehyde receives further confirmation from M. Berlioz and A. Trillat, who regard this body as equal, if not superior, to corrosive sublimate, and to have the advantage of being non-poisonous and readily diffusible. The disinfectant introduced as "formalin" is stated to be a solution of the body just referred to. Various new remedies for skin diseases have also met with notices in this volume.

A good deal of attention has lately been given to animal extracts, and more especially to thyroid extract, which has gained a high reputation as a remedy in the treatment of myxœdema. Processes for its preparation, as well as for the isolation of the active principle of the thyroid, are described by E. White, and the same subject is dealt with by E. Delpesch, who also gives an account of the preparation of cerebral and testicle extracts. The administration of thyroid extract by the mouth is shown by Dr. Mackenzie to produce the same effects as hypodermic injections.

The results of an examination of commercial specimens of liquid extract of ergot are published by W. B. Cowie, who, in view of the discrepancies exhibited by them, suggests definite characters and tests for introduction into the Pharmacopœia, such as would ensure the attainment of a reasonable standard of uniformity. Variations equally unsatisfactory are shown to exist in trade samples of the extracts of jalap and conium, and the ethereal extract of mezereon. A mixture of four volumes of alcohol and one of glycerin is suggested by J. P. Remington as the best men-

strum for the preparation of liquid extract of cinchona. Referring to the volumetric assay of narcotic extracts by the method of Beckurts or Dieterich, A. Partheil proposes the use of iodo eosin as the most suitable indicator. The necessity of standardizing all the official belladonna preparations is strongly urged by J. Barclay, who gives directions for the preparation of an alcoholic extract containing 3 per cent., a weaker dry extract (to take the place of the present green extract) containing 1 per cent., a tincture containing .025, and a liniment containing .25 per cent. of total alkaloid. Improvements in the process for the preparation of liquid belladonna plaster are suggested both by W. A. H. Naylor and R. Wright in communications read before the Nottingham Meeting of the British Pharmaceutical Conference. The results of the useful work carried out by E. H. Farr and R. Wright during the last three years, in connection with the alkaloidal tinctures of the British Pharmacopœia and their standardization, are embodied in an interesting summary contributed to the same meeting. With regard to the tincture of hemlock fruit, it is now suggested that this preparation should be standardized to contain .20 per cent. of conine, equivalent to 0.25 per cent. of the hydrochlorate, since it is found quite easy to obtain fruit yielding about 2 per cent. of alkaloidal hydrochlorates by collecting it at the proper stage of development and drying it with due care. The methods in use for the manufacture of concentrated tinctures and infusions are shown by E. Gane to yield unsatisfactory products. W. Bräutigam supplies some further information on the gelatinization of infusion of digitalis due to the action of a micro-organism. The loss of alkaloids incurred in the preparation of infusion and decoction of cinchona by various processes is discussed by I. W. Thomson. Easton's syrup forms the subject of reports by W. Lyon, W. Martindale, P. W. Squire, and R. Wright, dealing mainly with the liability of this syrup to crystallization and the means for its prevention. A rapid and convenient method for the preparation of mercurial ointment is recommended by H. Borntraeger, while a new process for the assay of this ointment is suggested by F. Boyeldien.

In the compilation of this volume a further effort has been made to limit its contents to matters of pharmaceutical interest, and to carry the condensation of the abstracts as far as seemed consistent with the general usefulness of the work.

CHEMISTRY.

YEAR-BOOK OF PHARMACY.

PART I.

CHEMISTRY.

Purification of Iodine. C. Meineke. (*Chem. Zeit.*, 1219-1220; 1230-1233.) Compare also *Year-Book of Pharmacy*, 1890, 20. Absolutely pure iodine may be obtained by fusing commercial iodine in a mixed solution of calcium chloride and potassium iodide to which a few drops of hydrochloric acid have been added. After cooling the iodine is washed, then sublimed with the addition of a little barium oxide, and the product re-sublimed.

The Action of Manganese Dioxide on the Decomposition of Potassium Chlorate by Heat. C. W. Faulkner. (*Amer. Journ. Pharm.*, February, 1893.) The author claims to have demonstrated that the well-known accelerating influence of manganese dioxide in the production of oxygen from potassium chlorate is not due to catalytic action. Sand is found to produce a similar effect, and the author therefore concludes that the action is a purely mechanical one, due to dilution of the chlorate and the consequent increase of its exposed surface.

Note on the Interaction of Iodine and Potassium Chlorate. T. E. Thorpe and G. H. Perry. (*Trans. Chem. Soc.*, No. 115.) The interaction is usually represented by the equation $3 \text{KClO}_3 + \text{I}_2 = \text{KClO}_4 + \text{KCl} + \text{KIO}_3 + \text{ICl} + \text{O}_2$; the authors find, however, that it primarily and in the main involves a simple interchange of iodine and chlorine: $2 \text{KClO}_3 + \text{I}_2 = 2 \text{KIO}_3 + \text{Cl}_2$. When care is taken in heating the mixture, it is possible to convert practically the whole of the iodine present into potassium iodate, the equivalent amount of gaseous chlorine being liberated.

Action of Potassium Permanganate on Sodium Hyposulphite.

C. Luckow. (*Zeitschr. für analyt. Chem.*, xxxii. 53-57.) The oxidation of the hyposulphite by permanganate at the boiling-point is found by the author to be in accordance with the equation $2\text{H}_2\text{S}_2\text{O}_3 + \text{O}_7 + \text{H}_2\text{O} = 2\text{H}_2\text{SO}_4 + \text{H}_2\text{S}_2\text{O}_6$.

Aluminium. M. Balland. (*Comptes Rendus*, cxiv. 1536-1538.) The author finds that aluminium is only slightly attacked by vinegar and saline solutions, and that it is less acted upon by air, water, beer, wine, coffee, tea, milk, fats, etc., than copper, tin, zinc, or lead. He considers it as very serviceable for domestic utensils.

The Atomic Weight of Cadmium. W. S. Lorimer and E. F. Smith. (*Zeit. anorg. Chem.*, i. 364-367.) The mean of the authors' determinations gives the number 112.055 ($\text{O} = 16$).

Atomic Weight of Copper. T. W. Richards. (*Chem. News*, lxxv. 236, 244, 260, 265, 281, 293, 302, and lxxvi. 7, 20, 29, 47, 57, 74, and 82.) The average result of the five most trustworthy series of the author's determinations gives 63.604 as the atomic weight of this metal.

Errors arising in Chemical Operations owing to the Employment of Gas Flames. A. Lieben. (*Monatshefte*, xiii. 286-298.) The author's results confirm E. v. Meyer's observation (see *Year-Book of Pharmacy*, 1891, 141) that during the evaporation of large quantities of liquids, an appreciable amount of sulphuric acid may be absorbed from the gases given off in the combustion of the coal-gas used for heating. His experiments show that the quantity of sulphuric acid thus absorbed varies considerably, under otherwise equal conditions, according to the nature of the liquid exposed during evaporation. He seems to regard this sulphuric acid as a direct product of the combustion of coal-gas; at any rate, he argues against the supposition that it is formed from sulphurous acid by oxidation.

E. Priwoznik, (*Ber. der deutsch. chem. Ges.*, xxv. 2676-2680) deals with the same subject, but arrives at the conclusion that free sulphuric acid is not given off in the combustion of coal-gas. He finds that sulphurous acid is formed which is subsequently oxidized, especially by oxygen condensed on platinum dishes. Ammonium sulphate is found by him to be always present in liquids kept evaporating for some time over a gas flame.

Oxidizing and Decolorizing Action of Charcoal. P. Caze-neuve. (*Chem. News*, March 30th, 1893. From *Pharm. Central-*

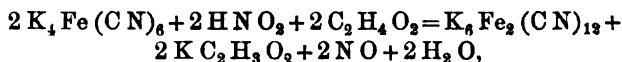
halle.) The author points out that in some instances the decolorizing action of charcoal is wholly or partly an oxidizing action, and that in such cases the decolorizing power of the charcoal will be destroyed or materially reduced if the latter be previously ignited and cooled in a current of dry nitrogen or carbon dioxide.

Animal Charcoal as a Decolorizer. T. R. Carswell. (*Pharm. Journ.*, 3rd series, xxiii. 615-617.) The author's results tend to show that carbon as such possesses no inherent power of decolorizing; that the use of animal charcoal for this purpose depends to some extent, especially for some colours, on its physical condition as an aggregation of cellular spaces, but mainly on its mineral constituents; that a research on these lines might furnish a decolorizing material, having all the advantages and none of the disadvantages of animal charcoal; and that attempts at purification are based on erroneous ideas.

Animal Charcoal. D. B. Dott. (*Pharm. Journ.*, 3rd series, xxiii. 664.) Referring to recent papers on this subject by J. Hodgkin (*Year-Book of Pharmacy*, 1892, 371) and T. R. Carswell (preceding abstract), the author admits that in many cases crude animal charcoal may be a better decolorizer than the purified product, especially in cases where the colouring matter forms an insoluble compound with the lime of the crude article, but he contends that there are colouring compounds which are much better removed by the purified charcoal. He also points out that the question of crude *versus* purified charcoal is not one entirely of decolorizing, and that there are instances in which the crude preparation is not admissible on account of the carbonates contained in it.

Synthesis of Hydrogen Nitride (Azoimide). W. Wislicenus. (*Ber. der deutsch. chem. Ges.*, xxv. 2084-2087.) Hydrogen nitride, or azoimide, H N_3 , also known by the names of *hydrazoic acid*, *imidazoic acid*, and *nitrohydric acid* (see *Year-Book of Pharmacy*, 1891, 19, and 1892, 23), has now been synthetically prepared by the author by the following simple process:—Metallic sodium is heated in a current of ammonia gas, and the resulting sodamide, Na N H_2 , heated in a current of dry nitrous oxide. The products of this last reaction are sodium nitride, sodium hydrate, and ammonia. By dissolving the sodium compounds in water and distilling with dilute sulphuric acid, a solution of hydrogen nitride passes over. Potassium or zinc may be employed in this process in the place of sodium.

A Reaction of Nitrites. C. M. van Deventer. (*Ber. der deutsch. chem. Ges.*, xxvi. 589-593.) On mixing a few drops of potassium ferrocyanide with a weak solution of potassium nitrite slightly acidified with sulphuric acid, and then adding a little acetic acid, a deep yellow coloration is produced. This reaction was long ago pointed out by Schäffer, and has now been further investigated by the author, who finds that it may be represented by the equation



and that it can be utilised both for the preparation of nitric oxide, and for the detection and estimation of nitrous acid, as the formation of nitric oxide takes place quantitatively. Full details of a quantitative method based on this reaction are given.

Preparation of Pure Nitric Oxide. F. Emich. (*Monatshefte*, xiii. 73-77.) Perfectly pure nitric oxide is obtained by treating mercury with a mixture of sulphuric and nitric acids. The absolute purity of the gas thus obtained can be proved by passing it over red-hot copper, which absorbs the whole of the oxygen forming Cu_2O , while the nitrogen is liberated and can be measured, and its weight calculated from the volume. The proportion of oxygen is exactly indicated by the increase in the weight of the copper.

Action of Nitric Acid on Potassium Bichromate. G. C. Schmidt. (*Ber. der deutsch. chem. Ges.*, xxv. 2917-2918.) In studying this action the author has only obtained potassium tetrachromate, K_2CrO_4 , $3CrO_3$. He regards the two crystalline compounds $Cr_2O_5(OK)NO_2$ and $Cr_3O_8(OK)NO_2$, described by Darmstädter, as mixtures of potassium nitrate and tetrachromate.

Action of Nitric Acid on Metals. C. Montemartini. (*Gazzetta Chim. Ital.*, xxii., i. 250-265, and 277-343.) The author has investigated the action of an excess of nitric acid of various degrees of strength on iron, nickel, cobalt, cadmium, and zinc. He considers that the oxidizing action of the acid takes place in conjunction with the water present, the latter entering into the reaction. Full details will be found in the paper.

Basic Nitrates. G. Rousseau and G. Tite. (*Comptes Rendus*, cxiv. 1184-1186, and cxv. 174-175.) The authors describe basic nitrates of zinc, cadmium, nickel, and calcium, obtained by heating the hydrated nitrates in sealed tubes with pieces of marble or lime. Their second paper deals with the decomposition of the basic

nitrates of copper, bismuth, and uranium. For particulars, reference should be made to the original.

A basic calcium nitrate is also described by E. Werner (*Comptes Rendus*, cxv. 169-171), and two basic nitrates of zinc by J. Riban (*Comptes Rendus*, cxiv. 1357-1358).

Metaphosphates. G. Tammann. (*Journ. prakt. Chem.* [2], xlv. 417-474.) The author describes two metaphosphoric acids, viz. α -metaphosphoric acid and β -metaphosphoric acid. The former is obtained as a soft, silky mass by heating orthophosphoric acid until the residue corresponds to the formula HPO_3 . The other is obtained by heating orthophosphoric acid until it sets to a glassy mass on cooling. Its potassium salt is insoluble in solution of potassium hydrate. The β -metaphosphates are more stable in water than the α -metaphosphates; they are all freely soluble, and can be separated from the α -salts by crystallization.

The greater part of the paper is devoted to a study of the metaphosphates hitherto described.

Supersaturated Aqueous Solutions of Carbonic Acid. L. Pratesi. (*Gazzetta Chim. Ital.*, xxii. 493-498.) The author shows that water which has been saturated with carbonic anhydride under pressure, and is then left for a short time under ordinary pressure, contains a much larger proportion of carbonic acid than water merely saturated with the gas under ordinary pressure. He accounts in this way for the fact that certain mineral springs contain a larger quantity of this gas than the maximum amount which water can absorb under ordinary conditions.

The Mineral Waters of Askern, in Yorkshire. C. H. Bothamley. (*Proc. Chem. Soc.*, No. 122.) Although the mineral waters of Askern have a well-established reputation in the treatment of chronic rheumatism and of skin diseases, no analyses of them have been made since those of Lankester and West, in or about the year 1840.

There are at present four wells or springs in the peat common on the edge of which the village of Askern stands, and to each of these is attached a pump room and a suite of baths. The author has examined samples of the waters collected at intervals extending over a period of nearly two years. They are surface or shallow spring waters, and are mainly solutions of calcium and magnesium carbonates and sulphates, containing a large quantity of dissolved peaty matter and a considerable amount of hydrogen sulphide; minute traces of iodine and lithium, but neither

bromine nor potassium, were detected. The approximate composition of the four waters, in grams per litre, is as follows:—

	Mother Close Well.	Terrace Baths.	Charity Baths.	Manor Baths.
Calcium carbonate	0·8417	0·8232	0·6825	0·6698
„ silicate	0·0281	0·0262	0·0443	0·0449
„ sulphate	0·5222	0·4434	0·4938	0·5151
Magnesium sulphate	0·3874	0·4288	0·7184	0·6834
Sodium chloride	0·0346	0·0989	0·1190	0·1205
„ sulphate	0·0426	0·0220	0·0659	0·0599
Total	1·8566	1·8425	2·1239	2·0936
Hydrogen sulphide	58·7c.c.	49·5 c.c.	34·8 c.c.	37·3 c.c.

It is pointed out that the production of the sulphuretted hydrogen is probably due to the action of an organism, although hitherto the author has failed in isolating one.

Solubility of Ammonia in Alcohol. S. Delépine. (*Journ. de Pharm. et de Chim.* [5], xxv. 496–497; *Journ. Chem. Soc.*, September, 1892.) The following table gives the solubility of ammonia in ethyl alcohol of various strengths and temperatures. The weight of gas contained in a litre of the solution saturated at 760 mm. is given, also the density of the solution, and the coefficient of solubility calculated from these data and the density of the solvent.

Degree of alcohol.	100°.	96°.	90°.	80°.	70°.	60°.	50°.
Melt- ing { weight of gas	130·5	146·0	173·0	206·5	—	246·0	304·5
ice { density	0·782	0·783	0·800	0·808	—	0·830	0·835
{ sol. coefficient	209·5	245·0	302·5	390·0	—	504·5	697·7
10° { weight of gas	108·5	120·0	137·5	167·0	—	198·25	227·0
{ density	0·787	0·803	0·794	0·800	—	0·831	0·850
{ sol. coefficient	164·3	186·0	234·4	288·0	—	378·0	438·6
20° { weight of gas	75·0	97·5	102·0	119·75	137·5	152·5	182·7
{ density	0·791	0·788	0·795	0·821	0·829	0·842	0·869
{ sol. coefficient	106·6	147·8	158·3	190·5	223·0	260·8	338·2
30° { weight of gas	51·5	74·0	77·0	81·75	100·3	129·5	152·0
{ density	0·798	0·791	0·796	0·826	—	0·846	0·883
{ sol. coefficient	97·0	106·7	114·0	121·6	—	211·6	252·0

Efflorescence of Crystallized Sulphates. A. Baubigny and E.

Péchar'd. (*Comptes Rendus*, cxv. 171.) The authors have experimented with the sulphates of zinc, cobalt, iron, and other metals, and find that the efflorescence of these salts is materially accelerated by the presence of small quantities of free acid.

Potassium Hydrate. D. B. Dott. (*Chemist and Druggist*, January 21st, 1893, 72.) The author points out that commercial specimens of potassium hydrate fall considerably short of the proportion of alkali required by the Pharmacopœia, though there is no difficulty in attaining the required strength in the preparation of this chemical.

Sodium Peroxide. (*Pharm. Centralhalle*, 1892, 699, and *Süd-deutsche Apotheker Zeitung*, 1892, 411.) Sodium peroxide, Na_2O_2 , is now prepared on a large scale, and is used as a bleaching agent. It occurs in the form of a deliquescent yellowish mass or powder, soluble in water with evolution of heat and liberation of oxygen. Its aqueous solution can be completely decomposed by boiling, but the dry anhydrous substance is not decomposed by heat. When treated with dilute acids it forms hydrogen peroxide, provided decomposition is prevented by cooling. The anhydrous preparation is formed when sodium is allowed to burn in dry air or oxygen, and is more economically prepared by strongly heating the monoxide or its hydrate in a powerful current of air, or by the decomposition of sodium nitrate at very high temperatures. The hydrated peroxide is formed by the addition of hydrogen peroxide to a 20 per cent. solution of sodium hydrate, and subsequent precipitation by alcohol. As sodium peroxide attacks animal fibres on account of its strong alkalinity, it is preferably used for bleaching purposes with an admixture of magnesium salts, which cause the formation of magnesium peroxide. A mixture of this kind now occurs in commerce under the name of "oxygen powder."

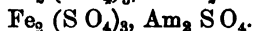
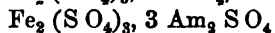
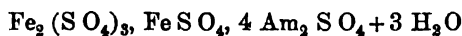
Lithium Bromate. A. Potilitzin. (*Journ. Russ. Chem. Soc.*, xxii. 392-393.) This salt is best prepared by double decomposition from lithium sulphate and barium bromate. Both the anhydrous salt, Li Br O_3 , and the monohydrated compound, $\text{Li Br O}_3 \cdot \text{H}_2\text{O}$, can be obtained in a crystallized state.

Preparation of Pure Strontium Salts. L. Barthe and M. Falières. (*Bull. Soc. Chim.* [3], vii. 104.) The authors find that the processes in use for the preparation of strontium salts fail to give products free from barium and calcium, and recommend the following method as free from this objection. Powdered strontianite is treated with hydrochloric acid of 1.10 specific gravity until it is nearly all dissolved. Ammonia is then added to remove

iron and alumina, the filtrate treated with an excess of sulphuric acid, and the precipitate thus formed washed first with highly diluted sulphuric acid and afterwards with water, until it is free from calcium and magnesium. The washed precipitate is now treated with an excess of a 10 per cent. solution of ammonium carbonate for several days with frequent agitation, then collected, thoroughly well washed, and the residue dissolved in pure dilute hydrochloric acid. The decanted solution is allowed to stand for twenty-four hours, afterwards filtered, and the filtrate mixed with one-fifth of its volume of strong hydrochloric acid and a moderate quantity of precipitated strontium sulphate (which need not be free from barium). The mixture is agitated repeatedly during the next few hours, then filtered, evaporated to dryness, the residue dissolved in water, the solution again filtered, and the filtrate evaporated to the point of crystallization. The strontium chloride thus obtained is absolutely free from barium and other impurities.

Reduced Iron. T. Appel. (*Oesterr. Zeitschr. für Pharm.*, 1892, 395.) The author points out that in order to obtain a satisfactory product, it is necessary to purify the hydrogen gas employed in the process. It was found that by exposing the heated ferric oxide to a current of hydrogen which had been passed successively through solutions of potassium permanganate, lead acetate, sulphuric acid, and finally over fused calcium chloride, a preparation was obtained which contained 99.7 per cent. of metallic iron, and was completely soluble in cold dilute sulphuric acid. The product obtained under exactly the same conditions with impure hydrogen contained only 58 per cent. of metallic iron. The fact that commercial specimens of reduced iron are generally so very impure is therefore attributed by the author to the use of impure hydrogen gas.

New Iron Salts. A. Lachaud and C. Lepierre. (*Comptes Rendus*, cxiv. 915-918.) Salts of the following formulæ have been prepared by the authors, and are described in this paper:—



They were all obtained by the gradual action of ferrous sulphate or ammonio-ferrous sulphate on fused ammonium sulphate under various conditions.

Lead in Glass Wool. L. Blum. (*Zeitschr. für analyt. Chem.*,

xxi, 292.) Attention is called by the author to the occasional presence of lead in glass wool, and to the unfitness of wool thus contaminated as a medium for the filtration of acid liquids.

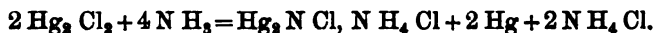
Adulterated Litharge. A. Schneegans. (*Journ. Pharm. Els.-Lothr.*, 1893, 41.) The author reports upon a sample of litharge adulterated with 10 per cent. of fine sand, coloured with ferric oxide.

Purifications of Zinc. H. Lescœur. (*Comptes Rendus*, cxvi. 58-60.) In order to obtain zinc pure enough for toxicological investigations, the commercial metal is first fused with potassium nitrate to remove sulphur and phosphorus, and then with zinc chloride to remove arsenic and antimony. The product may still contain copper, lead, or iron, which do not, however, interfere with its use for the purpose above named. Distillation of the purified metal would yield an entirely pure product.

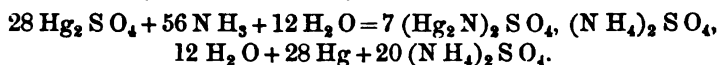
Silver Chloride. M. C. Lea. (*Amer. Journ. Sci.* [3], xlv. 446-447.) The loss of sensitiveness to light suffered by silver chloride on heating to 220° C. is attributed by the author to the complete expulsion of the moisture.

Gold Bromide. C. Patronillard. (*Bull. Comm.*, xx. 523.) This preparation may be readily obtained by gently heating for a few minutes one part of gold chloride with an equal weight of potassium bromide, 4½ parts of 10 per cent. sulphuric acid, and a sufficient quantity of water, then allowing to cool, and shaking repeatedly with ether until the aqueous layer is nearly colourless. The united ethereal solutions are treated with calcium chloride in order to remove the water present, and after settling and decantation allowed to evaporate at a slightly elevated temperature.

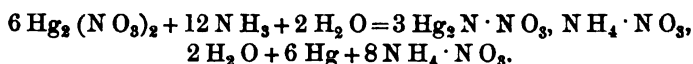
Mercuroso-Ammonium Compounds. L. Pesci. (*Pharm. Journ.*, 3rd series, xxiii. 4. From *Gazz. Chim. Ital.*) The author finds that the so-called mercuroso-ammonium compounds consist of the corresponding mercur-ammonium salts mixed with metallic mercury, which separates as a precipitate on treatment with a saturated solution of ammonium sulphate containing ammonia, the salts being readily soluble in this medium. The grey powder obtained on treating calomel with ammonia contains metallic mercury, and is partially dissolved by ammoniacal ammonium sulphate solution. It is very unstable in the presence of light, but when preserved from disturbing influences the reaction occurring in its formation is probably represented as follows:—



Similarly, the reaction between mercurous sulphate and ammonia, supposed to yield the compound $(\text{N H}_3 \cdot \text{Hg}_4 \text{O})_2 \text{SO}_4$, is shown to proceed as represented in the equation :—

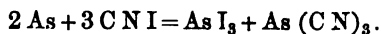


When mercurous nitrate remains in a slightly ammoniacal atmosphere, the basic nitrate $(\text{Hg}_{10} \text{ N}_6 \text{ O}_{20}, 2 \text{ H}_2 \text{ O})$ separates, and, on treatment with aqueous ammonia, a precipitate of variable composition is obtained. This reaction is shown to be represented thus :—



Arsenious Iodide. D. B. Dott. (*Pharm. Journ.*, 3rd series, xxiii. 619.) The results of the author's experiments show that it is practicable to prepare a salt of a composition nearly agreeing with the formula As I_3 , but that the tendency is towards a deficiency of iodine, that treatment with water produces extensive decomposition with separation of a very basic salt, and that the alternative method referred to in the *Pharmacopœia* does not yield a salt of the composition required.

Arsenic Cyanide. E. Guenez. (*Comptes Rendus*, cxiv. 1186–1189.) The author has obtained cyanide of arsenic, As Cy_3 , in the form of yellowish microscopic crystals, by treating finely powdered arsenic with a slight excess of dry cyanogen iodide and 10 parts of perfectly dry carbon bisulphide. When the reaction ceases it is completed by the heat of a water bath, and the product is freed from iodide of arsenic by washing with carbon bisulphide. The reaction is represented by the following equation :—



Phosphorus cyanide has been obtained by a similar reaction.

Arsenic cyanide is rapidly decomposed by moisture into arsenious and hydrocyanic acids; on heating, a portion of the cyanogen is given off, paracyanogen and arsenic remaining behind. Iodine converts the compound into arsenic iodide and cyanogen iodide. A mixture of arsenic cyanide and potassium chlorate explodes violently when struck with a hammer.

Action of Alkaline Mercuric Cyanide on Maltose, Dextrose, and Dextrin. J. A. Wilson. (*Chem. News*, lxx. 169.) The author's experiments were undertaken with the object of testing the

accuracy of the statement that alkaline solutions of mercuric cyanide destroy the optical activity of dextrose and maltose without affecting that of dextrin. His results show that on boiling these carbohydrates with the solution named, then acidifying the cooled solutions and clarifying with animal charcoal, the optical activity of dextrose is entirely destroyed, that of maltose reduced to about one-third, and that of dextrin to about nine-tenths of its original activity. The tests were performed under strictly equal conditions which are detailed in the paper.

Synthesis of Sugars. W. E. Stone. (*Chem. News*, lxi. 165-166, 179-180, 194.) This paper consists of a valuable *résumé* of recent work on this subject, but does not admit of being dealt with in the form of an abstract.

Synthetic Sugars from Glucose. E. Fischer. (*Liebig's Annalen*, cclxx. 64. From *Pharm. Journ.*) The author describes sugars containing seven, eight, and nine carbon atoms respectively, their compounds with phenylhydrazine and other reagents and the corresponding alcohols and carboxylic acids. Glucose acted on by hydrocyanic acid yields a cyanhydrin, which on hydrolysis gives two acids which are stereo-isomers of the formula $C_7H_{14}O_8$, α - and β -glucoheptonic acids. The relative proportion of one to the other in the product depends largely on the temperature of the reaction, but the α -compound always predominates. On oxidation to the corresponding dibasic acid, α -glucoheptonic acid yields inactive pentoxypimelic acid, while β -glucoheptonic acid similarly treated yields the dextrorotatory form of that substance. According to the author the isomerism depends on the position of the last-added alcoholic hydroxyl group relatively to the other hydroxyl groups. On reducing the lactones of the glucoheptonic acids with sodium amalgam, they yield respectively α - and β -glucoheptose. If the reduction is carried farther, the corresponding alcohols are formed, α - and β -glucoheptites; α -glucoheptose crystallizes in tables from water; it is slightly sweet to the taste, lævorotatory, and shows the phenomenon of bi-rotation, the rotatory power of a cold saturated solution being considerably diminished after standing for twenty-four hours and then remaining stationary. On adding another carbon atom to the molecule of the heptitol by means of the cyanhydrin reaction, two stereomeric glucooctonic acids were obtained; the structural difference between these could not be ascertained. Their lactones yielded on reduction α - and β -glucooctose and α - and β -glucooctitol. By repeating the treatment with hydrocyanic acid on α -glucooctitol,

stereomeric α - and β -gluconononic acids resulted, and from these the corresponding nonoses and nonitols were obtained by reduction. α -Glucocotose is a sweet crystalline substance, laevorotatory, showing bi-rotation; α -glucononose was not obtained crystalline, but only as a thick syrup. The alcohols derived from all these new sugars are crystalline substances. On heating any one of the above-named monocarboxylic acids with pyridine to 140° , a mixture of the two isomeric acids resulted; this is exactly analogous to what occurs when mannonic or gluconic acid is heated with chinoline, and when racemic or mesotartaric acid is heated with water. The acids and sugars formed all the usual compounds with phenylhydrazine, most of them well characterized by solubility and melting-point; while mannononose is fermentable by yeast, glucononose resembles mannoheptose and mannocotose in not being fermentable. This indicates that the capability of being attacked by yeast depends on the configuration of the molecule, as well as on the number of carbon atoms contained in it.

Sugar from Linseed. R. W. Bauer. (*Landw. Versuchs-Stat.*, xl, 480.) An infusion of linseed, after being treated with alcohol and ether, was boiled with dilute sulphuric acid, the filtered liquid mixed with chalk, evaporated, and the residue extracted with alcohol. A dextrorotatory sugar was thus obtained, which yielded with phenylhydrazine needles of an osazone fusing at 204° C.

Occurrence of Sorbite in Treacle. E. O. v. Lippmann. (*Ber. der deutsch. chem. Ges.*, xxv, 3218-3220.) The author has detected small quantities of sorbite in a sample of molasses from mixed sugars of various sources.

Action of Nitric Acid on Levulan. E. O. v. Lippmann and O. Hahn. (*Ber. der deutsch. chem. Ges.*, xxv, 3216.) The chief product of this oxidation is found to be oxalic acid. No mucic acid is formed.

Iodide of Starch. G. Rouvier. (*Comptes Rendus*, cxiv, 1366-1377.) The author has re-investigated the composition of iodide of starch prepared in presence of an excess of starch, and arrives at the conclusion that the compound formed under this condition corresponds to the formula $(C_6H_{10}O_5)_8I$.

Transformation Products of Starch. C. J. Lintner. (*Chem. Centralbl.*, 1892, 623.) In a further note on isomaltose the author expresses the opinion that the transformation products of starch are not so numerous as is supposed, and are probably limited to three; viz., dextrin, isomaltose, and maltose.

Products of the Oxidation of Starch. P. Petit. (*Comptes Rendus*, cxiv. 1375-1377. From *Journ. Chem. Soc.*) When 4 parts of starch, containing 20 per cent. of water, are mixed with 5 parts of pure ordinary nitric acid, a gummy mass is obtained, which, when heated at 40° for several days, swells up, becomes green, and finally yields a very bulky, white, porous product, equal in weight to the original starch.

When this product, which contains 6 per cent. of nitric acid, is heated at 100°, it becomes reddish-yellow, and then gives off reddish vapours. When treated with water, carbonic anhydride and nitrogen oxides are evolved, the evolution of gas being very abundant on heating, whilst dissolution is practically complete. In presence of alcohol there is less evolution of gas, and solution is much less complete in the cold; but on heating there is a violent evolution of gas, and about half of the solid matter dissolves.

The addition of ether to a cold alcoholic solution precipitates a white, gummy substance, which gradually becomes less soluble in alcohol. When purified by solution in water, and reprecipitation by alcohol, it has the composition $C_5H_6O_5$. It dissolves very readily in water, and the acid solution is strongly dextrogyrate; it reduces ammoniacal silver nitrate and Fehling's solution in the cold. Its specific rotatory power is $\alpha_D = +152.8$, and its reducing power is equal to 24.2 per cent. of that of glucose. The acid is monobasic with phenolphthaleïn as indicator, and with barium hydrate gives the salt $(C_5H_6O_5)_2Ba$; but if this is left in contact with the mother liquor it partially redissolves, and about half as much more alkali is required to produce a coloration with the phenolphthaleïn.

When thrown into a concentrated solution of phenylhydrazine acetate, the acid yields a hydrazone, $C_5H_6O_4:N_2HPh$, crystallizing from boiling water in rudimentary needles that melt with decomposition at about 100°.

The acid is insoluble in cold alcohol, but if boiled for a long time with water, or for a shorter time with dilute inorganic acids, it is converted into a new acid, $C_5H_8O_6$, which is readily soluble. The ammonium salt of the latter, $C_5H_7O_6 \cdot NH_4$, is sometimes obtained as a deliquescent amorphous product by the action of ammonia gas on the cold alcoholic solution of the original product. The corresponding hydrazone, $C_5H_8O_5:N_2HPh$, forms readily at 60-70°, and in a dry vacuum it loses water and changes into the hydrazone of the acid $C_5H_6O_5$.

The acid $C_8H_8O_6$ is monobasic, and its potassium and cadmium salts are amorphous.

Inulin. C. Tanret. (*Journ. de Pharm. et de Chim.*, April, 1893, 354.) The author has succeeded in separating from the substance known as inulin, two closely resembling, but nevertheless distinct principles, which he has named *pseudo-inulin* and *inulenin* respectively. Their compositions are represented by the formulæ $16 (C_6H_{10}O_5) \cdot H_2O$, and $10 (C_6H_{10}O_5) \cdot 2H_2O$. A full description of inulin and the two products named will be found in the original paper.

Carbohydrates. F. Ullik. (*Chem. Centr.*, 1892, 432-433. From *Journ. Chem. Soc.*) The carbohydrates, exclusive of the sugars, are grouped by the author as follows:—I., the amylums; II., cellulose; III., soluble starch; IV., dextrins; V., gums; VI., dextrin acids; VII., gum acids; VIII., pectins; IX., pectin acids.

The author considers that the last-named, the pectins and the "acid" bodies derived from them, belong strictly to the group of carbohydrates, because, on the one hand, glucoses may readily be obtained from them, whilst, on the other, substances corresponding with the pectins may be obtained from starch.

The addition of alkali, whether in excess or not, to the pectin acids, does not alter the rotatory power, and the same property belongs to some dextrins which have been obtained by the action of acids, and also to maltose. Pectin acids do not diffuse through a membrane, but their salts do so readily. The author separated a pectin acid from beetroot, the coefficient of rotation for which was $[\alpha]_D = 300$, and from which, by oxidation, 70-80 per cent. of mucic acid was obtained.

Soluble starch, cellulose, dextrose, and maltose all show the same rotatory power when dissolved in concentrated sulphuric acid.

Soluble starch appears to exist in different modifications, which are distinguished from one another in outward appearance, degree of solubility, and iodine reaction, but they all have the same rotatory power, namely, $[\alpha]_D = 199.6-200.8$.

Natural Synthesis of the Vegetable Hydrocarbons. L. Maquenne. (*Comptes Rendus*, cxiv. 677-680; *Journ. Chem. Soc.*, October, 1892.) Whilst it is easy to trace the connection between the carbohydrates, the fatty acids, and the paraffins, and to form some idea of the mode in which substances of these groups are formed in nature, there has been hitherto no direct connection established between the carbohydrates and the benzene family, much less with the terpenes and resins which are so abundant in

the vegetable kingdom. Now, however, it is shown that the heptene, C_7H_{12} , obtained by reducing perseitol with boiling hydriodic acid, and therefore a product of direct synthesis, is not only identical with the heptene extracted by Renard from resin oil, but has the characteristic properties of the terpenes, and may, in fact, be regarded as a lower member of that, or perhaps of the menthene, family.

Vegetable Cholesterin. E. Gérard. (*Comptes Rendus*, cxiv. 1544-1546.) The cholesterin obtained from phanerogamous plants is found to be identical in all its properties with Hesse's *phytosterin*. It is obtained by preparing an extract with ether, saponifying it with alcoholic potash, exhausting the dried soap with ether, and evaporating. The acicular crystals thus left are purified by treating with potash, then dissolving in water, and agitating the alkaline solution with chloroform. The product may be still further purified by converting the cholesterol into the benzoate, crystallizing the latter repeatedly from alcohol, and saponifying.

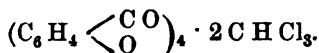
The corresponding product from cryptogamous plants agreed in its reactions with Tanret's *ergosterin*, and does not give the coloration with concentrated sulphuric acid and chloroform which characterizes phytosterin and animal cholesterin. It somewhat differs, however, from ergosterin in its melting-point and rotatory power.

Denitration of Pyroxylin. D. Woodman. (*Journ. Amer. Chem. Soc.*, xiv. 112.) On treating collodion films and thin sheets of celluloid with ammonium sulphide, and then washing with a copious stream of water, a substance is obtained, which, when ignited, burns like ordinary wood or paper. Its specific gravity is 1.545. It is slightly hygroscopic, strong, elastic, and translucent. Its application for the preparation of incandescent electric-lamp filaments is suggested.

Ether. D. B. Dott. (*Pharm. Journ.*, 3rd series, xxiii. 617-618.) The author finds that it is very difficult to prepare pure ether in large quantities of as low a specific gravity as .720, and that most of the commercial so-called pure ethers of low specific gravity contain methyl ether. He is inclined to think that in the next edition of the *British Pharmacopæia* the specific gravity test for pure ether should be altered to "not exceeding .724"; while, at the same time, methylated ether for anæsthetic purposes should be introduced, of a specific gravity not exceeding .718.

Preparation of Pure Chloroform. R. Anschütz. (*Ber. der deutsch. chem. Ges.*, xxv. 3512.) Some time ago the author showed

that by the action of phosphorus oxychloride on salicylic acid two crystalline products, salicylide and polysalicylide, could be obtained, of which the former is soluble in chloroform, forming with it a crystalline combination of the formula



The chloroform in this compound is loosely combined, and escapes on gentle heating; it is comparable to the water of crystallization in salts. The author now suggests that advantage may be taken of this observation for the purification of chloroform. The residual salicylide can, of course, be used over and over again. For this purpose it is not necessary to dissolve it in chloroform, but it suffices to keep it in contact with the latter for twenty-four hours at an ordinary temperature. None of the impurities of commercial chloroform are capable of forming crystals with chloroform.

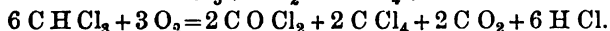
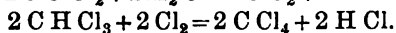
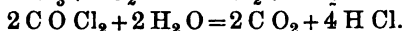
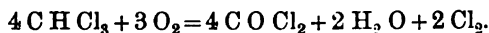
Salicylide chloroform is difficultly soluble in chloroform. If protected against air and heat, it can be kept unchanged for any length of time, and may be used for the rapid preparation of an absolutely pure chloroform for immediate use by the mere application of a gentle heat.

Chloroform. D. Brown. (*Pharm. Journ.*, 3rd series, xxiii. 505-506.) The author discusses the question how many varieties of chloroform are required to supply the demands for preparations suitable for anæsthetic and manufacturing purposes. He arrives at the conclusion that, although at present chloroforms are prepared from at least five different sources, there is no need for more than two qualities; viz., one of the highest degree of purity for anæsthetic purposes, and a second, not so highly purified, for the use of manufacturers. As to the first, he considers that chloroform to be the best and most suitable which, irrespective of origin, contains the smallest amount of impurity.

Observations on Decomposing Chloroform. D. Brown. (*Pharm. Journ.*, 3rd series, xxiii. 792-793.) Some time ago the author withdrew his zinc iodide and starch test in favour of Professor Ramsay's baryta water test, for the first indication of decomposition in chloroform. He now, however, finds that this reagent deserves the first place as an indicator, the nose the second, and that baryta water may be dispensed with altogether. Soon after zinc iodide and starch begins to indicate, decomposition may easily be recognised by the peculiar odour of carbonyl chloride, which indication renders the application of baryta water, or any

other reagent, quite unnecessary for the purpose of establishing the presence of decomposition. During its first stages a distinct reaction is obtained with zinc iodide and starch, but none with baryta water, a separation of water being also observed. After further decomposition, zinc iodide and starch gives a more marked reaction than at first, and baryta water also reacts, but faintly. Still following the decomposition, it is found that both reagents continue to give marked reactions until a point is reached, when that produced by zinc iodide and starch is observed to become less marked, and finally to disappear altogether, while the reaction with baryta water may still be obtained. A small quantity of deep straw-coloured liquid is also observed at this stage floating on the surface of the chloroform. At this point there remains a considerable quantity of undecomposed chloroform, which may, either before or after separating the decomposition products, be again put into an active state of decomposition by simply removing the stopper from the bottle for a few seconds, replacing it, and again exposing it to sunlight, when reactions similar to those already described with zinc iodide and starch are obtained. The author thinks that results such as those described could not have been obtained, if Professor Ramsay were correct in stating that carbonyl chloride and hydrochloric acid are the only products obtained from chloroform decomposing in the presence of air.

The following equations are given as a probable explanation of the changes observed:—



In harmony with this view, chlorine, water, and carbonyl chloride are found in the early stages, the chlorine being first recognised, and disappearing with the water at a more advanced stage, and the carbonyl chloride reaction being invariably obtained, not only in the early but also in the most advanced stage met with.

The quantities of carbonyl chloride found in different samples of decomposing chloroform do not exceed 0.57 per cent., and the ratio existing between it and the chlorine precipitable by silver nitrate in the early stages, changes as decomposition advances, the former decreasing and the latter increasing. In the early stages there was found 1 C O Cl₂ to 1.29 H Cl, and in the later

stages, 1 COCl_2 to 4.69 HCl . The ratio as represented by the foregoing equations in similar stages is 1 to 1+1 to 3, the difference being attributable to loss of carbonyl chloride. The straw-coloured liquid found in the advanced stages contains no free chlorine; it consists of a strong aqueous solution of hydrochloric acid in which very faint traces of carbonyl chloride are found, and contains 35.45 per cent. of HCl .

The author also confirms the observations that in a vacuum pure chloroform can be kept unchanged even on prolonged exposure to light, and that under ordinary conditions the stability of chloroform can be greatly increased by the reduction of the specific gravity (addition of alcohol). The experiments referred to in this paper were made with pure chloroform of 1.500 specific gravity, which had been dehydrated with barium oxide.

Attention is also called to the interesting observation that in an atmosphere of pure oxygen the decomposition of chloroform is greatly accelerated.

The Decomposition of Chloroform. C. Schacht and E. Biltz. (*Pharm. Journ.*, 3rd series, xxiii. 1005-1006.) The authors' results are on the whole confirmatory of those described by D. Brown (see preceding abstract). The equations given by the latter are found to be correct, but the authors add that they apply exclusively to the decomposition of chloroform which is perfectly free from alcohol. They find that absolutely pure chloroform has a specific gravity of 1.5020 at 15°C . (59°F). The proportion of alcohol present in samples of lower gravity may be deduced from the following data:—

		Specific gravity at 15°C . = 59°F .
Pure chloroform		1.5020.
" "	with 0.25 p.c. alcohol	1.4977,
" "	" 0.5 " "	1.4939.
" "	" 1.0 " "	1.4854.
" "	" 2.0 " "	1.4705.

According to the authors' experience, an addition of alcohol, amounting to one part in four hundred of chloroform (0.25 per cent.), is sufficient to prevent recognisable decomposition for one month or longer, with double that amount (0.5 per cent.) decomposition is prevented for nearly twelve months, and with one per cent. for many years. These, however, are only given as average statements, liable to variation in both directions, according to the varying intensity of light, etc.

Spirit of Nitrous Ether. C. O. Curtman. (*Pharm. Review*,

July, 1892.) The author records the results of an extensive series of analyses of commercial samples of ethyl nitrite and spirit of nitrous ether, and also deals with the principal volumetric and gasometric methods for the assay of these preparations. The paper concludes with useful tables for interpreting the results obtained by Allen's process. For particulars, reference should be made to the original article, a reprint of which will be found in the *Pharm. Journ.*, 3rd series, xxiii. 87-89 and 104-107.

Commercial Amyl Nitrite. C. O. Curtman. (*Amer. Journ. Pharm.*, August, 1892.) The author's assay of a number of commercial specimens of amyl nitrite by Allen's process shows a variation in strength from 27.1 to 93.7 per cent. He points out the necessity for the introduction of definite tests for the purity of this substance, and the insufficiency for this purpose of a mere statement of the specific gravity and boiling-point.

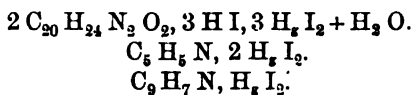
Butyl-Hypnal. M. Bernin. (*L'Union Pharmaceutique*, 1892, 444.) This product is a combination of antipyrine and butyl-chloral, and is described as forming colourless crystals of bitter taste, fusing at 70°, slightly soluble in water, and very soluble in alcohol, ether, benzol, and chloroform. It reduces potassium permanganate, and is decomposed by alkalies. A solution of butyl-hypnal forms a red coloration with ferric chloride, and a copious crystalline precipitate with picric acid.

A Method for the Preparation of Acetylene. M. W. Travers. (*Proc. Chem. Soc.*, No. 118.) Maquenne has recently published (*Comptes Rendus*, 1892) an account of a method of preparing acetylene by the interaction of water and barium carbide, the carbide being made by reducing barium carbonate with magnesium in the presence of carbon, a method which affords about half the calculated quantity of barium carbide. Wöhler obtained calcium carbide by heating calcium zinc alloy with carbon in a graphite crucible.

Calcium carbide may be prepared in quantity by reducing calcium chloride with sodium in the presence of carbon. The operation is conducted as follows:—45 grams of sodium are placed at the bottom of a deep iron bottle, and an intimate mixture of powdered gas carbon and calcium chloride, which has been well dried on a hot iron dish, is then introduced; the top of the bottle, furnished with a long neck, having been screwed on, the bottle is heated to bright redness during half an hour; it is then removed from the fire, stoppered, and cooled with water. When broken away from the bottle, the product is dark grey in

colour, and consists of sodium chloride, calcium carbide, and the excess of carbon added to render the mass less compact; usually about 16 per cent. of carbide is formed, which is half the theoretical quantity. In practice, 1 gram of sodium thus converted into carbide is found to yield 240 c.c. of acetylene, instead of 487 c.c., the calculated equivalent quantity.

Mercuriodides of Organic Bases. A. B. Prescott. (*Amer. Chem. Journ.*, xiv. 606-611.) The author describes compounds of quinine, pyridine, and quinoline obtained by precipitating solutions of the alkaloids with the requisite amount of decinormal solution of potassium mercuriodide. The composition of the three compounds is represented by the following formulæ:—



Piperazine. W. Majert and A. Schmidt. (*Pharm. Journ.*, from *Proc. Chem. Soc.*, No. 119, 35.) The authors state that erroneous statements have appeared in several modern text-books regarding the physical and chemical characters of piperazine, $\text{C}_4\text{H}_{10}\text{N}_2$, the properties of the impure substances of like composition, diethylenediamine and ethylenimine, discovered by Von Hofmann and Ladenburg, having been confused with those of the former compound. It is pointed out that piperazine is especially characterized by the formation of an insoluble pomegranate-red double salt with bismuth iodide, and of a dibenzoyl compound melting at 191° . The authors also mention that they have succeeded in preparing a series of hydrates of piperazine, the one most readily formed being a hexhydrate which crystallizes from dilute aqueous solutions.

Micro-Chemical Distinction of Alkaloids and Proteic Matter. L. Errera. (*Pharm. Journ.*, 3rd series, xxiii. 48.) The author's experiments show that alcohol containing tartaric acid (recommended by Stas for the micro-chemical extraction of alkaloids) answers the double purpose of dissolving the alkaloids and precipitating proteic matter so as to differentiate them micro-chemically. For the preparation of the reagent he recommends the use of crystallized tartaric acid and alcohol, in the proportion of 1 g. to 20 c.cm. Sections thick enough to contain one layer of entire cells are soaked in this liquid for twenty-four hours. They are then removed from time to time, placed in distilled water, and treated with the general reagents—iodide of potassium, double

iodide of mercury and potassium, phosphomolybdic acid, etc. In the case of alkaloids, these will have been removed by the alcohol, and the reactions will therefore not occur; but proteids will have remained in the cells, and the reactions will be obtained in the same way as in a direct examination of a section.

The Identity of Caffeine and Theine. W. R. Dunstan and W. F. J. Shephard. (*Proc. Chem. Soc.*, No. 117.) Mays, and more recently Lauder Brunton and Cash, having concluded that "theine" from tea differs in its physiological action in certain respects from "caffeine" from coffee, the authors have deemed it desirable to compare the products from the two sources. They conclude that their identity is beyond question. The observed differences in physiological action must be ascribed either to impurities in the materials used, or to differences in the animals to which they were administered; the circumstance that "theine" has been found to be more active and to be capable of producing effects not produced by "caffeine" tends to support the view that the "theine" was impure, especially as it is known that tea contains other alkaloids.

Caffeine Salts. E. Schmidt. (*Archiv der Pharm.*, ccxxxi. 1.) The author supplies further evidence of the existence of definite chemical compounds of caffeine with both inorganic and organic acids, and describes a number of the salts and the methods of their preparation. For particulars the original paper should be consulted.

Caffeine-Iodol. E. Konteschweller. (*Pharm. Centralhalle*, 1893, 95.) This compound is obtained in the form of a pale grey, crystalline, odourless, and tasteless precipitate, by mixing alcoholic solutions of caffeine and iodol in molecular proportions. It contains 74.6 per cent. of iodol and 25.4 per cent. of caffeine, and is insoluble, or nearly so, in most solvents. Its composition is represented by the formula $C_8H_{10}N_4O_2C_4I_4NH$.

Cocaine Hydrochlorate. W. Kinzel. (*Pharm. Zeitung*, 1893, 25.) The author finds that the melting-point of the perfectly pure salt is 201–202° C., and not 181.5° C., as has been repeatedly stated.

Benzoyl Pseudotropine (Tropacocaine). O. Hesse. (*Pharm. Journ.*, 3rd series, xxiii. 241.) This base occurs, associated with cocaine, cocaine, cinnamylcocaine, and other bases, in Java coca, and to some extent in other coca leaves. It was first recognised by Giesel, and subsequently investigated by Liebermann. The name tropacocaine was suggested for this base by Dr. Chadbourne

on medical rather than chemical grounds. More recently this alkaloid and the products of its decomposition have been studied by the author, who supplies the following statement of his results:—The base crystallizes in colourless plates of fatty lustre, melting at 48° , and possessing the general characters assigned to it by Liebermann. Its composition is represented by the formula $C_{15}H_{19}NO_2$.

The hydrochloride, $C_{15}H_{19}NO_2, HCl$, is very soluble in water. When crystallized from alcohol it has the form of large rhombic crystals, and when precipitated from alcoholic solution by ether the form of extended laminæ. The salt melts at $269^{\circ}C.$, and is scarcely soluble in ether. Its water solution is optically inactive.

The platinum salt $(C_{15}H_{19}NO_2)_2, PtCl_6H_2$, obtained by precipitation, forms small pale yellow needles sparingly soluble in water. Liebermann described the salt as amorphous.

On treating a solution of benzoyl pseudotropeine in methylic alcohol with methyl iodide, colourless crystals soon separate, which consist of benzoyl pseudotropeine methyl iodide, $C_{15}H_{19}NO_2, CH_3I$, which is tolerably soluble in hot methylic or ethylic alcohol. The corresponding chloride, $C_{15}H_{19}NO_2, CH_3Cl$, obtained by treatment with freshly precipitated silver chloride, crystallizes on evaporating the solution in stout prisms or needles. The platinum salt $(C_{15}H_{19}NO_2CH_3)_2, PtCl_6 + 2H_2O$, has the form of orange-coloured needles, sparingly soluble in cold water. The gold salt $(C_{15}H_{19}NO_2CH_3)_2, AuCl_4$, has the form of a yellow crystalline precipitate, sparingly soluble in cold water. When a water solution of the iodide is shaken with freshly precipitated silver oxide, a strongly basic solution of the benzoyl pseudotropeine hydrate is obtained, and on evaporating this solution in the exsiccator an almost colourless residue is obtained, which is readily soluble in water.

Liebermann stated that by the splitting up of benzoyl pseudotropeine with hydrochloric acid it was converted into benzoic acid, and a base which he regarded as being identical with that obtained from hyoscine by Ladenburg. The author has, however, found that the base produced from hyoscine has a different composition from pseudotropeine, and it has been named by him oscine.

After separating the benzoic acid, produced by the action of hydrochloric acid upon benzoyl pseudotropeine, and evaporating the acid solution, a crystalline residue is obtained, from which the base formed by the splitting up of benzoyl pseudotropeine can be

obtained by adding caustic soda and shaking with chloroform. On evaporating the chloroform solution, the pseudotropine remains in the form of prisms, which gradually become moist on exposure, and melt at 108° . In other respects it agreed with Liebermann's description, and as the formula of benzoyl pseudotropine is $C_{15}H_{19}NO_2$, the base can only have the composition represented by the formula $C_8H_{15}NO$, as Liebermann found was the case.

The pseudotropine hydrochloride crystallizes, on evaporating the water solution, in the form of long needles which rapidly deliquesce. On adding to the solution platinum chloride, the platinum salt soon crystallizes out as orange-red tabular crystals readily soluble in water. On evaporating the solution the salt crystallizes in fine prisms. In both cases the crystals have a marked lustre, which they rapidly lose on warming from loss of water of crystallization. At $100^{\circ}C$. the salt becomes anhydrous, and then melts at $206^{\circ}C$. Analysis gave results agreeing with Liebermann's formula— $(C_8H_{15}NO)_2, PtCl_6H_2 + 4H_2O$.

The gold salt has the form of yellow laminæ, and melts at 202° .

Pseudotropine combines readily with methyl iodide, solidifying with evolution of heat. After recrystallization from water, the compound has the form of colourless rhombohedral crystals generally grouped like those of ammonium chloride. It is anhydrous, and melts at $270^{\circ}C$. The chloride has the form of stout rhombohedral crystals, which are anhydrous, readily soluble in water, sparingly in alcohol. The platinum salt is anhydrous, melts at $216^{\circ}C$., and crystallizes well from hot water. Pseudotropinemethylhydroxide becomes brown on evaporating its water solution in the exsiccator.

Cinchona Alkaloids. A. Claus. (*Liebig's Annalen*, cclxix. 232–294.) This paper contains an account of a considerable number of methyl, ethyl, and benzyl derivatives of quinidine, cinchonidine, and cinchonine, and of compounds of these derivatives. For particulars, reference should be made to the original.

Constitution of Cinchona Alkaloids. W. J. Comstock and W. Koenigs. (*Ber. der deutsch. chem. Ges.*, xxv. 1539–1551; *Journ. Chem. Soc.*, August, 1892.) In the light of Skraup's experiments, the authors now hold the view that only one quinoline residue is present in the cinchona alkaloids, and that the so-called second complex ($C_{10}H_{16}NO$), which in cinchonine and cinchonidine is combined with a quinoline residue, and in quinine and quinidine with a paramethoxyquinoline residue, consists of

hydrogenized benzene and pyridine nuclei combined in a manner similar to that which Merling has suggested for tropine and ecgonine. In support of this hypothesis, the authors cite the inferior stability of the above-mentioned complex ($C_{10}H_{16}NO$), in comparison with that of a quinoline residue; furthermore, whilst Merling has shown that tropine and ecgonine give tropinic acid, $C_8H_{13}NO_4$, on oxidation, Skraup has obtained cincholenponic acid, $C_8NH_8Me(COOH)_2$, on oxidizing the cinchona alkaloids.

Bases Homologous with Quinine. E. Grimaux and A. Arnaud. (*Comptes Rendus*, cxiv. 672-673.) The bases described by the authors in this paper are cupreïne, *quinopropyline*, *quinisopropyline*, and *quinamyline*. For particulars the original should be referred to.

Quinine Double Salts. E. Grimaux. (*Comptes Rendus*, cxv. 608-610; *Journ. Chem. Soc.*, February, 1893, i. 115.) When 30 parts of crystallized basic quinine sulphate (1 mol.) is dissolved in 24.9 c.c. of hydrochloric acid of the sp. gr. 1.050 (2 mols.), and the solution allowed to evaporate spontaneously in dry air, the salt $(C_{20}H_{23}N_2O_2)_2, 2HCl, H_2SO_4 + 3H_2O$, is obtained in acicular crystals, which lose 3 mols. H_2O at 100° . One part of the anhydrous salt dissolves in 1.16 parts of water at 25° . The hydrated salt melts at 120° , and the anhydrous salt melts, indistinctly, with some decomposition, at $165-170^\circ$. If only half the quantity of hydrochloric acid is used, solution takes place much less easily, and the hot liquid, when cooled, deposits basic quinine sulphate. On further evaporation, it yields the hydrochloro-sulphate.

Quinine hydrobromosulphate $(C_{20}H_{23}N_2O_2)_2, 2HBr, H_2SO_4 + 3H_2O$, is obtained in a similar manner, by dissolving the basic sulphate (1 mol.) in hydrobromic acid (2 mols.). It forms a hard, white mass of small needles, loses 3 mols. H_2O at 100° , and is less soluble than the chlorine compound.

The hydriodosulphate is obtained in a similar manner, and forms yellowish crystals, which lose water in a dry vacuum or at 100° , and becomes brown, but absorb water and regain their yellow colour when exposed to the air.

Phosphoric acid yields analogous double salts. The chlorine compound has the composition $(C_{20}H_{23}N_2O_2)_2, 2HCl, H_3PO_4 + 9H_2O$. They all crystallize in needles, the bromide with 7 mols. H_2O , and the iodide with 6 mols. H_2O .

Analysis of Quinine Sulphate and Estimation of Quinine in

Presence of other Cinchona Alkaloids. L. Barthe. (*Comptes Rendus*, cxv. 1085-1088. From *Journ. Chem. Soc.*) The author admits that Léger has the prior claim as originator of a volumetric process for the estimation of alkaloids, based on the use of phenolphthaleïn.

If different weights of commercial quinine sulphate are agitated with a given volume of water at 15-20°, the quantity of decinormal potassium hydrate required for the saturation of the saturated solutions is greater the greater the quantity of quinine sulphate taken. Moreover, the progressive increase in the quantity of alkali required is in a constant ratio with the weight of quinine sulphate taken. Quantities of 1, 2, 3, 4, and 5 grams of quinine sulphate respectively were agitated frequently with 100 c.c. of water at 20°, and after an hour were filtered. The solutions required respectively 4.6, 5.3, 6.0, 6.7, and 7.4 c.c. of potash solution. The constant difference, 0.7 c.c., represents the quantity of sulphates, other than quinine, present in each gram of the sulphate taken. It is the factor which measures the impurity, and the latter may be calculated to crystallized cinchonidine sulphate (equiv.=397); then $0.7 \times 100 \times 0.0397 = 2.779$, the percentage of cinchonidine sulphate in the sulphate employed.

The analysis of quinine sulphate can therefore be made in the following way:—Two quantities of 1 gram and 5 grams of the salt are each agitated with 100 c.c. of water at 20° for frequent intervals during an hour, filtered, and the filtrate titrated with decinormal potash. The difference between the quantities of alkali required by the two solutions, multiplied by the expression $100 \times 0.0397 \div 4$, gives the percentage of impurity calculated as cinchonidine sulphate.

The solubility of quinine sulphate for a given temperature between 12° and 20°, and even 25°, is sensibly different, according to the conditions under which the solubility is determined. At 12°, 1000 c.c. of water dissolve 1.482 grams of quinine sulphate when the latter is triturated and agitated with it for about an hour; at 20°, 1000 c.c. dissolve 1.744 grams, but if the liquid is allowed to remain in contact with the excess of dissolved salt, and is frequently agitated, the temperature can be reduced to 12° without any of the salt separating from solution; that is to say, 1000 c.c. contain 1.744 grams of the salt. If, on the contrary, the liquid remains at rest whilst cooling from 20° to 12°, or to 15°, the quantity of salt remaining in solution per litre is 1.482 to 1.787 grams, and is not always the same for the same final

temperature. The differences are still greater if the liquid remains at rest for 24 or 48 hours, and the solubility may then be as low as 1.133 and 1.09. The solutions thus obtained are stable *after filtration*, even at temperatures several degrees below the temperature of saturation. They cannot dissolve any more quinine sulphate at the temperature at which they were formed, or at a lower temperature, but they can dissolve 9.92 grams per litre of crystallized cinchonidine sulphate, and 12.42 grams of crystallized cinchonine sulphate.

In order to estimate quinine in cinchona bark, a chloroform solution of the alkaloids obtained by any of the ordinary methods is vigorously and repeatedly agitated with a measured excess of decinormal sulphuric acid, evaporated until the chloroform is expelled, and the excess of acid estimated by means of standard alkali and litmus. Sufficient sulphuric acid is added to the mixture to redissolve the alkaloids, which are then reprecipitated by potassium hydrate, and dissolved in chloroform. The chloroform solution is evaporated just to dryness with the exact quantity of sulphuric acid found in the first titration to be necessary for complete neutralization. The residue is triturated with 200 c.c. of a solution of pure quinine sulphate saturated at 20°; after two hours' digestion, the liquid is filtered. The filtrate is a saturated solution of quinine sulphate containing the sulphates of the other alkaloids. 100 c.c. are titrated with potassium hydrate, using phenolphthaleïn as indicator. Twice the volume of alkali required, *minus* 8 c.c., gives the quantity of impurities, which can be calculated to crystallized cinchonidine sulphate. The result can be controlled by estimating the quantity of quinine sulphate left on the filter.

Apocinchonine and Diapocinchonine. E. Jungfleisch and E. Leger. (*Comptes Rendus*, cxiv. 1192-1195.) The authors have investigated these two bases which Hesse had previously obtained by the action of hydrochloric acid on cinchonine. Apocinchonine is likewise formed when dilute sulphuric acid is used in place of the hydrochloric in this reaction, and exists in that part of the product which is insoluble in ether and in weak alcohol. With the latter acid, however, a lower yield is obtained, and certain oxy-bases are formed which are not found in the product of the action of hydrochloric acid. These oxycinchonines are found not to exist as impurities in the original cinchonine as had been suggested.

As to diapocinchonine, the authors arrive at the conclusion that

this body is not a chemical compound, but a mixture of bases among which cinchoniline and cinchonigine have been recognised.

Cincholine and Fluoroline. O. Hesse. (*Liebig's Annalen*, 271, 95-100; *Pharm. Journ.*, 3rd series, xxiii. 266-267.) The author finds that cincholine, a volatile base hitherto supposed to be a constituent of cinchona bark, does not occur in that bark at all, but emanates from the hydrocarbon oil employed as a solvent in the course of the preparation of the ordinary cinchona bases. A quantity of crude cincholine supplied by Dr. Weller, which boiled between 230° and 260° , was purified by conversion into oxalate, and the portion boiling between 236° and 240° submitted to analysis. Its composition is found to correspond to the formula $C_{10}H_{21}N$. It is a liquid of high refractory power, rather lighter than water, and having an odour like pyridine, apparently allied to the piperidine bases and homologous with coniine, but not poisonous.

In the preparation of cocaine a similar base has been obtained by Hesse, Giesel, and others, which was at first designated by the collective name *hygrine*, and since termed fluoroline. This also is now found to originate from the oil used for extracting cocaine from the coca leaves. As now obtained by the author, fluoroline is an oily liquid heavier than water, slightly soluble in water, readily in dilute acids, from which it is separated by caustic soda, communicating to the liquid a strong blue fluorescence. It is a homologue of quinoline, having a composition represented by the formula $C_{12}H_{13}N$.

Carpaine. M. van Ryn. (*Archiv der Pharm.*, April, 1893.) The crystallizable alkaloid of *Carica Papaya* has been further investigated by the author, who finds its composition to correspond with the formula $C_{14}H_{27}NO_2$. It fuses at $119.5^{\circ}C$., is very bitter, dextro-rotatory, insoluble in water, but soluble in alcohol and chloroform.

Strychnine. J. Tafel. (*Ber. der deutsch. chem. Ges.*, xxvi. 333-335.) The author describes a number of characteristic crystalline acids formed in the oxidation of strychnine by dilute and strong nitric acid. One of these appears to be a derivative of quinoline or isoquinoline. It is hoped that further researches in this direction will throw additional light on the constitution of strychnine.

Derivatives of Strychnine. J. Tafel. (*Liebig's Annalen*, cclxviii. 229-255.) The author's observations show that

strychnine derivatives behave in many respects just like derivatives of tetrahydroquinoline, and probably contain a tetrahydroquinoline nucleus. The derivatives discussed in this paper are *nitrosostrychnic acid*, $\text{NO} \cdot \text{C}_{20} \text{H}_{21} \text{NO} (\text{COOH}) : \text{NH} + \text{H}_2 \text{O}$, *methylstrychnic acid*, $\text{COOH} \cdot \text{C}_{20} \text{H}_{23} \text{NO} : \text{NMe} + 2\frac{1}{2} \text{H}_2 \text{O}$, *ethyl nitrosomethylstrychnate*, $\text{NO} \cdot \text{C}_{20} \text{H}_{21} \text{NO} (\text{COOEt}) : \text{NH}$,

deoxystrychnine, $\text{C}_{20} \text{H}_{28} \text{N} \begin{array}{c} \text{CO} \\ | \\ \text{N} \end{array} + 3 \text{H}_2 \text{O}$, and *deoxystrychnic acid*, $\text{COOH} \cdot \text{C}_{20} \text{H}_{26} \text{N} : \text{NH} + \text{H}_2 \text{O}$.

Codeine. M. Göhlich. (*Apotheker Zeitung*, viii. 95.) The isomer of codeine obtained by Anderson and by Armstrong by the action of moderately dilute sulphuric acid on codeine, is identified by the author with the base recently described by Merck as pseudocodeine.

The author also gives the formulæ of a large number of salts of codeine based on the formula $\text{C}_{18} \text{H}_{31} \text{NO}_3$ for the pure alkaloid.

Laudanine. G. Goldschmiedt. (*Monatshefte*, xiii. 691-696.) Laudanine is isomeric with tetrahydropapaverine, but not identical with it. Its constitution is represented by the formula $\text{C}_{17} \text{H}_{15} \text{N} (\text{OMe})_3 \text{OH}$. It is optically inactive in alcoholic, as well as in acid solutions.

Researches on Opium Alkaloids. T. and H. Smith and Co. (*Pharm. Journ.*, 3rd series, xxiii. 793-795.) In this report the authors supply information respecting the alkaloids *xanthaline* and *gnoscopine*, originally discovered in 1881 and 1878 respectively: The former of these, which has not hitherto been described, is found to correspond to the formula $\text{C}_{37} \text{H}_{38} \text{N}_2 \text{O}_9$, and is stated to be a white crystalline powder, melting at 206°C ., insoluble in water and alkalies, sparingly soluble in boiling spirit, more easily in benzol, and very easily in chloroform. It is a weak base, but forms a well-defined salt with mineral acids possessing a more or less intense yellow colour. It dissolves in sulphuric acid with a strong yellow colour like thebaine, but is not decomposed unless heat be applied; on standing, or more quickly on the addition of water, the dark orange gives way to a pale yellow, and the sulphate of xanthaline crystallizes out in soft yellow needles. This reaction is said to be very striking. By nascent hydrogen it is converted into hydro-xanthaline, a new base of the formula $\text{C}_{37} \text{H}_{38} \text{N}_2 \text{O}_9$. The least trace of this body produces with strong sulphuric acid a deep

violet solution, which becomes colourless on dilution with water, but regains its colour on adding more acid. The immediate production of this colour without the addition of nitric acid readily distinguishes this base from cryptopine.

Gnoscopine is shown to have a composition corresponding to the formula $C_{22}H_{23}NO_7$, and to be isomeric but not identical with narcotine. It crystallizes in slender needles, which are only very slightly soluble in boiling alcohol, and fuse at $228^\circ C$. It forms the same oxidation products as narcotine, and resembles the latter in its reactions with sulphuric and nitric acids. The authors have succeeded in obtaining it from narcotine, and have found this product to be perfectly identical with gnoscopine obtained direct from opium.

Solanaceous Alkaloids. O. Hesse. (*Liebig's Annalen*, cclxxi. 100-126; *Journ. Chem. Soc.*, December, 1892.) The greater part of this paper consists of a description of well-known salts of hyoscyamine, atropine, and hyoscine, and of a discussion of the results of other chemists' work on the alkaloids of belladonna.

Hyoscine has the composition $C_{17}H_{21}NO_3$, and not $C_{17}H_{23}NO_3$, as supposed by Ladenburg and Merck; it melts at about 55° , and dissolves freely in ether, chloroform, and alcohol, but is only moderately easily soluble in water; its specific rotatory power in alcoholic solution at 15° is $[\alpha]_D = -13.7^\circ$.

The author proposes that Ladenburg's pseudotropine or hydroxytropine should be called *oscine*; the composition of oscine is $C_8H_{13}NO_2$, not $C_8H_{15}NO$. *Benzoyloscine*, $C_{15}H_{17}NO_4$, prepared by heating oscine at $80-100^\circ$ with an equal weight of water and a large excess of benzoic anhydride, crystallizes from chloroform in needles, melts at 59° , and is readily soluble in ether, alcohol, chloroform, and acids, and moderately easily in water. The *aurochloride*, $C_{15}H_{17}NO_4 \cdot HAuCl_4$, crystallizes in small yellow needles, and melts at 184° .

Hyoscine and Scopolamine. A. Ladenburg. (*Ber. der deutsch. chem. Ges.*, xxv. 2388-2394.) The author reaffirms the correctness of the formula $C_{17}H_{23}NO_3$ for hyoscine, and disputes the identity of this base with scopolamine suggested by Schmidt (see *Year-Book of Pharmacy*, 1892, 38). In support of his statement he quotes the results of further analyses and crystallographic measurements, as well as the observation that pseudotropine and tropic acid are obtained in the hydrolysis of this base. He however admits the occurrence of scopolamine in commercial hyoscine; but since both bases have the same physiological action, he does

not regard this circumstance as likely to interfere with the therapeutic application of hyoscine.

Hyoscine and Scopolamine. E. Schmidt. (*Ber. der deutsch. chem. Ges.*, xxv. 2601-2607.) In reply to Ladenburg (see preceding abstract), the author repeats his assertion that the commercial hyoscine preparations examined by him, and supplied to him as salts of Ladenburg's base (hyoscine), not merely contain, but consist essentially of salts of scopolamine. Whether hyoscine of the formula $C_{17}H_{23}NO_3$ has no existence, as asserted by Hesse, or whether such a body does occur after all in henbane seeds or other *Solanaceae*, the author leaves for the present an open question.

Solubility of Hyoscyamine Hydrobromide. E. Merck. (*Merck's Jahresbericht*, 1892.) The author finds that this salt, melting at $149-150^\circ$, dissolves in 0.34 part of water at 15° C. and in 2.2 parts of alcohol of 0.820 sp. gr. Hyoscine hydrobromide requires for solution 4 parts of water at 15° C., and 21.5 parts of alcohol of the strength just named.

Pseudohyoscyamine, a New Alkaloid from Duboisia Myoporoides. E. Merck. (*Archiv der Pharm.*, 1893, 110-123.) From the chloroform solution of the alkaloids of this plant, after removing hyoscyamine and hyoscine as far as possible by crystallization, the new base, pseudohyoscyamine ($C_{17}H_{23}NO_3$), is separated by the addition of ether. It is laevorotatory, very difficultly soluble in water and ether, but readily soluble in alcohol and chloroform, and crystallizes in small yellowish needles fusing at $133-134^\circ$ C. Boiling with baryta water converts it into tropic acid and a base isomeric with tropine and pseudotropine.

Atropamine. E. Merck. (*Pharm. Journ.*, 3rd series, xxiii. 606.) The author continues to maintain that the base to which Hesse had given the name of atropamine is identical with apotropine. He considers the data given by Hesse in reference to the melting-points of the base, and of the hydrochloride, platinum and gold salts, are to be regarded as evidence in favour of his view. The fact that apotropine is scarcely altered by strong caustic soda at 100° C. is also relied upon by the author, as well as the behaviour of the base towards hydrochloric acid and its conversion into belladonnine.

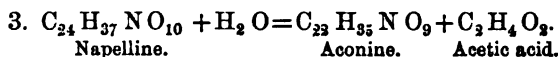
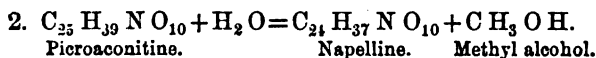
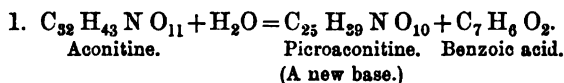
Nitroatropine. A. Einhorn and L. Fischer. (*Ber. der deutsch. chem. Ges.*, xxv. 1390-1391.) 40 c.c. of a mixture of equal volumes of strong nitric and sulphuric acids are treated at a temperature of 0° C. with 10 grams of atropine gradually added in small successive portions. After the completion of the reaction

an excess of potassium carbonate is carefully added to the mixture while the same low temperature is maintained, and the nitroatropine then extracted by means of ether. It is an oily liquid which, when treated with alcoholic HCl, forms a crystallizable hydrochloride. On boiling nitroatropine with hydrochloric acid, and subsequent oxidation with potassium permanganate, paranitrobenzoic acid is obtained.

Action of Hypochlorous Acid on Tropine. A. Einhorn and L. Fischer. (*Ber. der deutsch. chem. Ges.*, xxv. 1391-1394.) The authors describe a compound of the composition $C_7H_6NCl_5O$, obtained by treating an aqueous solution of tropine with a solution of hypochlorous acid. They regard it as having a constitution corresponding to the formula $C_6H_5NCl_4 : CH \cdot OCl$.

Aconitine. A. Ehrenberg and C. Purfürst. (*Journ. f. prakt. Chem.*, xlv. 604.) A redetermination of the composition of pure aconitine induces the authors to adopt the formula $C_{32}H_{43}NO_{11}$, which differs somewhat from those found by Wright and Luff and by Dunstan and Umney. The alkaloid used in their investigation was purified by recrystallization from ether, the first and last fractions being rejected. The melting-point of the intermediate fraction was found to be 193–194° C.

By hydrolysis with alcoholic potash, or by heating with water to 150° C., a series of successive changes occur which are represented by the following equations :—



It will thus be seen that the changes occurring in this hydrolysis are not so simple as was supposed when they were represented as consisting in the direct formation of benzoic acid and aconine.

The so-called amorphous aconitine of commerce is found by the authors to be a variable mixture of aconitine, picroaconitine, and napelline.

Contributions to the Chemistry of the Aconite Alkaloids. Part IV. Isaconitine (Napelline). W. R. Dunstan and E. F. Harrison. (*Proc. Chem. Soc.*, No. 119.) The authors have investigated

the nature and properties of the alkaloid found together with aconitine in the roots of *Aconitum napellus*, to which it was proposed to assign the old, disused name of napelline; this alkaloid always occurs in the roots to as large an extent as aconitine, and in some cases to a larger extent. The preparation of the pure substance is fully described in the paper. Its separation from aconitine is based on the superior solubility of the latter in ether, while its superior solubility in chloroform affords a means of separating it in greater part from the other associated alkaloids; it is finally purified by recrystallizing its hydrochloride. It is found to be *isomeric* with aconitine, and the name *isaconitine* is therefore now adopted instead of napelline.

Isaconitine has hitherto always been obtained in a colourless, friable, varnish-like form, resisting all attempts to crystallize it; it is readily dissolved by alcohol and chloroform, less readily by ether, and it is only slightly soluble in water, though more so than aconitine. The alcoholic solution is feebly dextro-rotatory.

The *hydrochloride*, $C_{33}H_{45}NO_{12} \cdot HCl$, crystallizes from water in rosettes soluble in alcohol, containing 1 mol. prop. of water. The aqueous solution is intensely bitter, and is lævorotatory to almost the same extent as the aconitine salt, $[\alpha]_D = -28.74^\circ$.

The corresponding *hydrobromide* and *hydriodide* form similar crystals, but are anhydrous; the latter salt is lævorotatory. $[\alpha]_D = -26.94^\circ$. All these compounds somewhat resemble the corresponding aconitine salts in their physical properties.

Isaconitine exhibits a remarkable behaviour with auric chloride, which sharply distinguishes it from aconitine, and, indeed, from most other alkaloids. Hitherto no definite *aurichloride* has been obtained, but it is found that when solutions of the hydrochloride and of auric chloride are mixed, a yellow, amorphous precipitate is produced as in the case of aconitine; on recrystallizing this from alcohol, nearly colourless crystals are obtained of an *aurochlorisaconitine*, of the formula $C_{33}H_{44}(AuCl_2)NO_{12}$. This is apparently a derivative of the alkaloid in which one atom of hydrogen is displaced by the group $AuCl_2$. The first known alkaloidal derivative of this type—namely, *aurochlorcaffeine*—was described a short time ago by Dunstan and Shephard. The production of such a compound from napelline was altogether unexpected. *Aurochlorisaconitine* differs, however, from *aurochlorcaffeine* in not being reconverted into the *aurochloride* by the action of hydrogen chloride.

When *isaconitine* is heated either with water in closed tubes

or under ordinary pressure with mineral acids, it is gradually hydrolysed. The hydrolysis is more rapidly effected by aqueous solutions of soda or potash, which act even in the cold. It yields the same products as aconitine and the same proportions, viz., aconine and benzoic acid, $C_{33}H_{45}NO_{12} + H_2O = C_{26}H_{41}NO_{11} + C_7H_6O_2$.

The physiological action of isaconitine has been compared with that of aconitine by Prof. Cash, who finds that the action of the two alkaloids is entirely distinct. A solution of a pure isaconitine salt does not produce the tingling sensation on the tongue which is so characteristic of aconitine; and while aconitine is a most violent poison, even in excessively minute doses, relatively considerable quantities of isaconitine must be administered to small animals in order to produce a toxic effect, which effect is the result of a physiological action in the main distinct from that of aconitine. The authors consider it doubtful whether isaconitine would prove toxic to man, except when given in very large doses.

The new alkaloid now described under the name of isaconitine is entirely different from the mixtures of amorphous alkaloids called napelline by the earlier workers. It also differs in composition and properties from the picraconitine of Wright and the amorphous bases since obtained from the roots of *Aconitum napellus* by other investigators. Having regard to the manner in which these amorphous bases were prepared, and to the extreme difficulty which is experienced in preparing pure isaconitine, the conclusion is drawn that they were not single substances.

Contributions to the Chemistry of the Aconite Alkaloids. Part V. The Composition of some Commercial Specimens of Aconitine. W. R. Dunstan and F. H. Carr. (*Proc. Chem. Soc.*, No. 119.) The authors have examined a number of English and foreign specimens of aconitine. Some of these were obtained from J. W. L. Thudichum, who collected them some years ago and found that they differed enormously in their toxic power, many being nearly inert, while a few were highly poisonous.

The process used in examining these "aconitines" was essentially that described in the preceding communication, by means of which aconitine, isaconitine, homoisaconitine (homonapelline), and aconine could be isolated, and the quantity of each approximately determined. The method of estimating aconitine first proposed by Wright, and recently advocated in a slightly modified form by Allen, in which the benzoic acid produced on hydrolysis of the mixture of alkaloids is reckoned as derived from aconitine, is valueless, since isaconitine furnishes benzoic acid in the same

proportion as aconitine when hydrolysed. Sixteen specimens of "aconitine from *A. napellus*" and its salts were examined. Most of the samples were amorphous; these were invariably found to contain but a very small proportion of aconitine, in some cases none, but were chiefly composed of the amorphous alkaloids aconine, isaconitine, and homoisaconitine, all of which appear to be very slightly, if at all, toxic. It would seem that, as a rule, "amorphous aconitine" represents the total alkaloids of the root. Of the crystalline specimens of alkaloid only two were pure, most of them being contaminated with more or less amorphous alkaloid. The specimens of aconitine salts examined were found, in nearly every case, to be chiefly isaconitine salts containing only small quantities of aconitine compounds. Hence it is not surprising that great differences have been observed in the mode of action and toxic power of commercial "aconitine." The authors consider it as most important that in future nothing but pure crystalline aconitine, possessing the characters fully described in Part I. of this series of papers, should be used in medicine; and it is satisfactory that a pure alkaloid of this description can now be obtained in commerce.

Conversion of Aconitine into Isaconitine. W. R. Dunstan and F. H. Carr. (*Pharm. Journ.* From a paper read before the Chemical Society, June 15th, 1893.) This report forms contribution No. VI. to the knowledge of the aconite alkaloids. In a previous communication it has been shown that the roots of *Aconitum napellus* contain, besides the highly poisonous aconitine, an almost non-poisonous isomeride, isaconitine. The constitutional relationship of the two alkaloids is evidently an intimate one, since each alike furnishes the same hydrolytic products, viz., aconine and benzoic acid. The authors now show that when *aconitine hydrobromide* (m.p. 163°) is heated in aqueous solution, it very gradually changes into the isomeric *isaconitine hydrobromide* (m.p. 282°). The change is facilitated by the presence of a small quantity (1-2 per cent.) of free hydrobromic acid, but is not assisted if sufficient is present to induce hydrolysis of a large proportion of aconitine.

The isaconitine was identified not only by the high melting-point of its salt, but also by the formation and analysis of the characteristic anchlorisaconitine. No similar change could be detected in *aconitine nitrate* when this salt is heated either in neutral or acid solution, neither could the conversion be effected by heating aconitine with glacial acetic acid, although in this

case anhydro-aconitine is produced if the heating is continued for eighteen hours at 120°. Dissolution of aconitine in concentrated sulphuric acid fails to convert it into isaconitine, even after gently heating, and aconitine sulphate does not appear to undergo any conversion when it is heated for many hours in contact with very dilute sulphuric acid. No isaconitine seems to be produced during the hydrolysis of aconitine by cold soda solution. The authors are making further experiments in the hope of gaining information with regard to the mechanism of the conversion of aconitine hydrobromide into isaconitine hydrobromide.

Some Modifications of Aconite Aurichloride. W. R. Dunstan and H. A. D. Jowett. (From a paper read before the Chemical Society, June 15th, 1893.) This paper constitutes contribution No. VII. to the chemistry of the aconite alkaloids carried out by W. R. Dunstan in conjunction with others. When auric chloride is added to a solution of aconitine hydrochloride, a yellow amorphous precipitate is thrown down, from which three crystalline modifications can be obtained by employing different solvents. The α -aurichloride is obtained by crystallization from a mixture of acetone and water, the β -aurichloride by crystallization from strong alcohol, and the λ -aurichloride by recrystallizing the β -aurichloride from a mixture of chloroform and ether. The β - and λ -modifications when melted are changed into the α -salt. The three modifications differ in their crystalline form and melting-points, but they all yield exactly the same crystalline aconitine.

The Alkaloids of Aconitum Napellus. W. R. Dunstan. (*Pharm. Journ.*, 3rd series, xxiii. 765-768.) In this paper the author deals with the pharmaceutical aspects of the series of investigations of the aconite bases carried out by him in connection with others in the Research Laboratory of the Pharmaceutical Society during the last two years. He considers that, apart from matters of general scientific interest, these investigations have led to the following results of immediate practical importance to medicine and pharmacy:—

1. The complete definition of the properties and proximate constitution of pure crystalline aconitine, which in future should be exclusively used medicinally for "aconitine," as a substance of definite and invariable composition, capable of producing constant therapeutic effects.

2. The demonstration of the existence in the roots of *Aconitum napellus*, besides aconitine, of three, and possibly of four, amor-

phous alkaloids which constitute, as a rule, at least 75 per cent. of the total alkaloids.

3. The demonstration of the fact that commercial amorphous "aconitine" chiefly consists of these amorphous alkaloids.

4. The separation of two of these alkaloids (aconine and isaconitine) in a pure state and a description of their composition and chief chemical properties.

5. The demonstration of the fact that one of them, present in the roots as a rule to as large an extent as aconitine, possesses the same chemical composition as aconitine and furnishes on hydrolysis the same decomposition products.

6. A comparison of the chemical properties of these two alkaloids, aconitine and isaconitine, has shown that whilst they present certain similarities, as in the formation of somewhat similar crystalline salts, there is a marked difference in their chemical constitution, although they are both isomeric *benzoylaconines* and are represented by the same empirical formula.

7. It has been established that whilst aconitine is a most powerful poison in very minute doses, neither its isomeride isaconitine, nor its hydrolytic product aconine, are toxic in the same doses.

Cytisine, the Alkaloid of *Cytisus Laburnum*. A. Partheil. (*Archiv der Pharm.*, cccxxx. 448-498.) The author concludes from the behaviour of this base towards methyl iodide, acetic anhydride and nitrous acid, that one of its nitrogen atoms is in secondary, and the second nitrogen atom either in tertiary or quaternary combination. The fact that methyleytisine does not yield an acetyl derivative is regarded as proof that the oxygen atom exists neither in the form of methoxyl nor of hydroxyl.

A number of derivatives of cytisine have been examined by the author side by side with the corresponding products from ulexine, the alkaloid isolated by Gerrard from *Ulex Europæus*. The results afford further ^{confirmation} ~~confirmation~~ of the perfect identity of the two bases (see also *Year-Book of Pharmacy*, 1891, 42, and 1892, 47).

Hydrastine. M. Freund. (*Liebig's Annalen*, cclxxi. 311-408.) In this paper the author gives a consecutive account of the results of investigations hitherto published by which the constitution of hydrastine has been determined, and also describes the more important decomposition products of this alkaloid. For particulars, reference should be made to the original article.

Hydrastine Bitartrate. E. Merck. (*Merck's Jahresbericht*, 1892.) The author has obtained this salt in the form of white

needles readily soluble in hot water, but sparingly so in cold water. The composition corresponds to the formula



The salt is well adapted for use in medicine, and for the preparation of perfectly pure hydrastine.

Berberine and Hydroberberine. C. Link. (*Archiv der Pharm.*, cccxx. 291-320.) In this paper the author deals with the products of the action of bromine on solutions of berberine and hydroberberine sulphates, and also with a number of compounds of hydroberberine with ethyl iodide and bromide, and of these with gold and platinum chlorides. For particulars, the original should be consulted.

Pseudopelletierine. G. Ciamician and P. Silber. (*Ber. der deutsch. chem. Ges.*, xxv. 1601-1604, and xxvi. 156-159.) The authors confirm Tanret's observation respecting this base, and describe a number of its salts, derivatives, and decomposition products.

The Active Principles of Sabadilla. R. Fisher. (*Amer. Chem. Journ.*, September, 1892.) The greater part of this paper consists of an historical sketch of the literature of the alkaloidal principles extracted from sabadilla, and should be referred to for particulars. Special reference is made to the confusion arising from the application of the name veratrine to entirely different substances. This term is used by the U.S.P. to represent the mixture of alkaloids as prepared from sabadilla seed. Conerbe, who first investigated the composition of this mixture, applied the name veratrine to an amorphous alkaloid; later, Merck applied it to his crystalline alkaloid, and this term was used quite generally until Wright and Luff named the crystalline alkaloid cevadine, and mentioned an amorphous alkaloid under the name veratrine, claiming priority on account of Conerbe's researches. The terms cevadine, veratrine, and cevadalline, as used by these latter investigators, have been adopted in both the "United States" and "National Dispensatories," Maisch's "Materia Medica," Beilstein's "Organische Chemie," and several other books; while Richter's "Organic Chemistry" still applies the name veratrine to Merck's base, and mentions cevadine as identical with it.

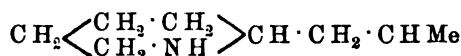
The author regards the addition of any acid to the alcohol used for extracting the seeds to be entirely unnecessary, and considers extraction by percolation to be the most satisfactory process. The application of heat for evaporating the alcohol appears to be

free from objection. Ether is found to be the most suitable menstruum to be employed in the estimation of total alkaloids, giving a larger yield and a purer product. His experience leads him to infer that this yield has hitherto been stated too low, and may occasionally amount to nearly 2 per cent.

Natural and Artificial Muscarine. G. Nothnagel. (*Ber. der deutsch. chem. Ges.*, xxvi. 801-806.) The author has compared natural muscarine, from the *Fly agaric*, with the artificial base obtained from choline by oxidation with nitric acid. He finds them alike in their physical and chemical properties, but to differ somewhat in their physiological action. Artificial muscarine induces paralysis of the intermuscular nerve-terminations in the frog, and myosis in the pupil of the eyes of birds, while neither of these effects is produced by the natural base.

Alkaloid in the Nettle. MM. Oddi and Lomonaco. (*Pharm. Journ.*, 3rd series, xxiii. 3.) The authors have isolated from the common nettle a crystalline alkaloid, which is fatal to frogs in the dose of one centigramme. They found that an aqueous extract of the plant had but slight general effect in the case of mammals, though in frogs it produced paralysis of central origin and slackened the movement of the heart, finally arresting it in diastole.

A Homologue of Coniine. F. Jacobi and C. Stoebr. (*Ber. der deutsch. chem. Ges.*, xxvi. 949-951.) On reducing α -isobutylene-pyridine with sodium ethoxide, a *methylconiine* of the formula



is obtained in the form of a colourless liquid. A description of this base and of some of its compounds is given in the paper.

Nicotine. A. Pinner and R. Wolffenstein. (*Ber. der deutsch. chem. Ges.*, xxv. 1428-1433. From *Journ. Chem. Soc.*) The authors have attempted to obtain compounds of known constitution from oxynicotine, $\text{C}_{10}\text{H}_{13}\text{N}_2\text{O}$ (obtained by the action of hydrogen peroxide on nicotine), by heating it with hydrochloric acid and with barium hydrate. With hydrochloric acid, a compound, $\text{C}_{10}\text{H}_{14}\text{N}_2\text{O}$, which the authors name pseudonicotine oxide, is obtained. With barium hydrate, nicotine is obtained, together with a non-volatile resin.

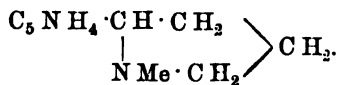
Pseudonicotine oxide is prepared as follows:—Oxynicotine is heated with eight times the quantity of fuming hydrochloric acid for 8-10 hours at 140° , the dark-coloured product is made alkaline with

soda, and then distilled with steam as long as the distillate is alkaline. The distillate is acidified with hydrochloric acid and evaporated to crystallization, when the *hydrochloride*, $C_{10}H_{14}N_2O, 2HCl$, is obtained. This crystallizes from alcohol in white leaflets, melts at 192° , gives, with mercuric chloride, a double salt melting at 212° , and yields a *platinochloride*, $C_{10}H_{14}N_2O, H_3PtCl_6$, which crystallizes in small needles and begins to decompose at 120° . The *free base* is obtained by decomposing the hydrochloride with sodium hydrate and extracting with ether; on evaporating the ether, an oil is left, which quickly turns red on exposure to air. It is soluble in water in all proportions, and is precipitated as an oil by concentrated sodium hydrate. Besides pseudonictine oxide, a basic, brownish-black resin, which is not volatile with steam, is also formed.

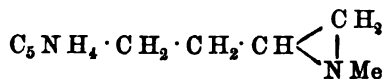
Dehydronicotine, $C_{10}H_{13}N_2$, is an oil which passes over between 265° and 275° , when freshly prepared pseudonictine oxide is distilled. It does not turn red on exposure to air, and is somewhat sparingly soluble in water. The *picrate* forms very small, prismatic crystals, and melts at 208° . The *platinochloride* is orange-coloured, and does not melt at 260° .

The physiological action of pseudonictine oxide and dehydronicotine is very similar to that of nicotine. The oxygen-free base, $C_{10}H_{13}N_2$, has as intense an action as nicotine itself. Pseudonictine oxide is about 20 times weaker.

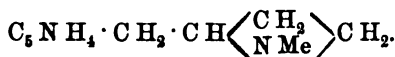
Nicotine. A. Pinner. (*Ber. der deutsch. chem. Ges.*, xxv. 2807–2821 and xxvi. 292–305.) In this paper the author deals with bromo derivatives of this base, and the compounds and decomposition products of dibromodehydronicotine. His results lead him to infer that the constitution of nicotine may be represented by the formula



Constitution of Nicotine. F. Blau. (*Ber. der deutsch. chem. Ges.*, xxvi. 628–633.) The author arrives at the conclusion that the constitution of nicotine is represented by the formula



or



He considers such a constitution as also in entire harmony with the results described by Pinner.

Action of Piperidine and Pyridine on Haloid Salts of Cadmium. R. Varet. (*Comptes Rendus*, cxv. 464-466.) The author describes a number of compounds of cadmium chloride, bromide, and iodide with piperidine and pyridine. For particulars, reference should be made to the original.

Oxidation Products of Piperidine. R. Wolffenstein. (*Ber. der deutsch. chem. Ges.*, xxv. 2777-2785.) The author has investigated the action of hydrogen peroxide on piperidine. When the latter is treated with a three per cent. solution of twice its weight of the peroxide, glutaric acid is formed. With a smaller proportion of the same oxidizing agent, amidovaleraldehyde, $C_6H_{11}NO$, is produced; while with a still smaller proportion (equal weights of hydrogen peroxide and piperidine), crystals of the composition C_5H_9NO are obtained, which are isomeric with Schotten's piperidone. The action of ozone is analogous to that of hydrogen peroxide, but proceeds more slowly.

Pyridine-like Bases in Petroleum. R. Zaloziecki. (*Monatshelte*, xiii. 498-503.) The dilute acid with which the crude petroleum had been washed was freed from tarry matters and distilled with an excess of lime. The distillate was found to contain substances resembling the pyridine bases.

Bases from Oil of Polei (*Mentha Pulegium*). O. Wallach. (*Liebig's Annalen*, cclxxii. 122-125.) The two bases produced when this oil is heated with ammonium formate correspond to the formulæ $C_7H_{15}N$ and $C_{14}H_{27}N$ respectively. The former boils at $170^\circ C.$, the latter at 250 . Both form crystalline platinochlorides. When the liquid pulegone oxime is reduced with sodium and alcohol, it is converted into a base differing entirely from either of the two referred to, but resembling fenchylamine and menthylamine in some of its properties.

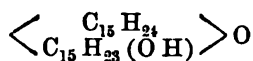
Pinyllamine. O. Wallach and G. Lorentz. (*Liebig's Annalen*, cclxviii. 197-210.) Pinyllamine is a thick, colourless oily liquid, readily soluble in alcohol, ether, and chloroform, but nearly insoluble in water. Its specific gravity at $17^\circ C.$ is .943. On keeping and exposure it rapidly turns yellow, and gradually decomposes with liberation of ammonia.

The greater part of the paper is devoted to the description of a number of compounds and derivatives of this body.

Sesamin. J. F. Tocher. (*Chemist and Druggist*, February 18th, 1893, 238.) The author describes the result of further experiments

on the crystalline constituent isolated by him some time ago from sesame oil (see *Year-Book of Pharmacy*, 1891, 226), and for which he now proposes the name "sesamin." For particulars, reference should be made to the original article.

Urson. W. Gintl. (*Chemiker Zeitung*, xvii. 436.) Urson, $C_{30}H_{48}O_3$, was discovered by Trommsdorf in the leaves of *Arctostaphylos uva ursi*, in which it is associated with arbutin. The author has investigated the chemical structure of this body, and arrives at the conclusion that it is represented by the formula



Cerberin. P. C. Plugge. (*Archiv der Pharm.*, 1893, 10-34.) Cerberin is a poisonous glucoside isolated by the author from a species of *Cerbera*, an East Indian plant belonging to the Apocynaceæ. It fuses at 175-176° C., corresponds to the formula $C_{37}H_{40}O_8$, and is not identical with either tanghinin or thevetin, with which it agrees in some respects. Its physiological action resembles that of digitalin. Full details respecting it will be found in the original paper.

Glucosides of Convolvulaceæ. N. Kromer. (*Chem. Centr.*, 1893, i. 310-312.) The glucosides described in this paper are scammonin, $C_{88}H_{156}O_{42}$, the resinous glucoside of the roots of *Convolvulus scammonia*; and turpethin, $C_{76}H_{128}O_{36}$, the glucoside of the roots of *Ipomœa turpethum*. For particulars the reader is referred to the original.

Digitalin. H. Kiliani. (*Archiv der Pharm.*, ccxxx. 250-262; *Journ. Chem. Soc.*, December, 1892.) The leaves and seeds of *Digitalis purpurea* contain *digitonin*, a crystalline inactive glucoside resembling saponin, the crystalline substance *digitoxin*, and two amorphous glucosides, *digitalin* and *digitaleïn*. Of these, digitonin is useless as a remedy for heart disease, and, moreover, causes severe local inflammation, whilst digitoxin is unsuitable as a drug on account of its complete insolubility in water. The other two would be suitable if prepared pure. The digitaleïn of Schmiedeberg is a mixture; not so, however, his digitalin, which is a chemical principle of marked individuality, and is now met with in commerce in the pure state under the name of "*Digitalinum verum*." This body is perfectly uniform in its operation, gradually producing cessation of the heart's action, but no injurious secondary

effects. Other preparations, such as "*Digitalinum crystallisatum*" and "*D. purum pulveratum*," are impure, and consequently irregular and often injurious in their action. The first of these, indeed, is nearly pure digitonin.

"*Digitalinum verum*" is an amorphous, white powder, which is insoluble in chloroform and in ether, swells up in water, and dissolves in it to the extent of 1 part in 1000. 50 per cent. alcohol dissolves 1 part in 100, absolute alcohol still more. The pure substance has but a feebly bitter taste. As tests for its purity, the following may be used:—(1) A few particles placed in a test-tube with 2 c.c. of 10 per cent. aqueous potash should remain white for at least one minute; the presence of the other amorphous glucosides causes an immediate yellow coloration. (2) It is stirred with water to a thin paste, 22 parts of amyl alcohol added, with shaking, for every 100 parts of water used, and the whole allowed to remain in a corked flask; if digitonin is present, it separates out within 24 hours in small, crystalline agglomerates. When heated with strong hydrochloric acid, best with the addition of 50 per cent. alcohol, digitalin is converted into *digitaligenin*, $C_{16}H_{22}O_2$, dextrose, and *digitalose*, $C_7H_{14}O_6$, a sugar which could not be obtained crystalline, but which, when oxidized with bromine, yields *digitalonic lactone*, $C_7H_{12}O_6$. This substance crystallizes in fine, colourless prisms, easily soluble in water and alcohol, sparingly in ether. It begins to liquefy at 130° , and melts completely at $138-139^\circ$. If it is heated with aqueous soda, and the diluted solution treated with silver nitrate, silver digitalonate, $C_7H_{13}O_6Ag$, crystallizes out in tiny needles.

Note on the Preparation of Digitogenin. The method previously given should be modified by carrying out the hydrolysis in alcoholic solution. Digitonin, $C_{27}H_{46}O_{14} + 5H_2O$ (1 part), is heated with 93 per cent. alcohol (8 parts), and concentrated hydrochloric acid of sp. gr. 1.19 (2 parts) for $1\frac{1}{2}$ hours in a reflux apparatus on the water-bath, and the mixture allowed to cool slowly. The digitogenin which separates out, to the extent of about 25 per cent. of the digitonin employed, is removed, the filtrate saturated with chalk, the greater part of the alcohol distilled off, and the residue diluted with water and shaken out with chloroform. The chloroform extract is dried with sodium sulphate, the chloroform distilled off, and the residue crystallized from 93 per cent. alcohol; by this means a further yield of 5 per cent. of digitogenin is obtained.

Cantharidin. L. Spiegel. (*Ber. der deutsch. chem. Ges.*, xxv. 1468-1470 and 2956-2960.) This paper is exclusively devoted to

the products obtained in the action of phenylhydrazine on cantharidin. For particulars, reference should be made to the original.

Preparation of Cantharidin. M. De buch y. (*Journ. de Pharm. et de Chim.*, xxv. 13.) The author recommends the application of methyl-formic ether in the place of the menstrua usually employed for extracting the cantharides, and the use of petroleum ether in place of carbon bisulphide for washing the impure cantharidin.

Helenin. M. Posth. (*Pharm. Journ.*, 3rd series, xxiii. 341.) The author has ascertained that helenin, $C_{15}H_{20}O_2$, is not the anhydride of alantic acid, but has the characters of a lactone, and while it is convertible into a salt of alantic acid by warming with solution of caustic alkali, alantic acid (m.p. $94^{\circ}C.$) is converted into the lactone (m.p. 76°) by heating, with separation of water. The methyl ester of alantic acid yields, on heating, helenin and methylic alcohol. The amide yields helenin and ammonia.

Reduction Products of Santonin. G. Grassi-Cristaldi. (*Gazz. Chim. Ital.*, xxii. 123-129.) The products described in this paper are *santonone*, *santononic acid*, *isosantonone*, and *isosantononic acid*. For particulars, reference should be made to the original.

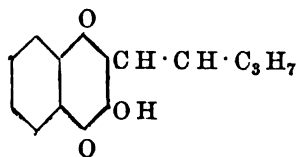
Reactions of Santonin. J. Schermer. (*Apotheker Zeitung*, 1893, 77.) On fusing santonin with potassium cyanide, the mixture assumes a red colour, changing quickly to brown-yellow; the solution of the fused mass in water is brown, and shows a green fluorescence. On fusing santonin with potassium hydrate a red coloration is produced, which becomes darker on further heating. Treated with water the fused mass forms a red solution, changing to brownish-yellow, and ultimately to yellow. The colour reaction with sulphuric acid and ferric chloride is best applied by dissolving the santonin in sulphuric acid in a test-tube, and adding to the solution 1 c.c. of water containing half a drop of ferric chloride solution. A yellow coloration is thus obtained which, upon the application of heat, changes to a fine violet.

Santonin Acid. L. Francesconi. (*Gazzetta Chim. Ital.*, xxii. 181-205.) The paper deals with derivatives of santononic acid, $C_{15}H_{20}O_4$, giving a description of the oximes of this acid and of ethyl santonate, the hydrazone and amine of ethyl santonate, and hyposantononic acid, $C_{15}H_{20}O_3$. For particulars the original should be consulted.

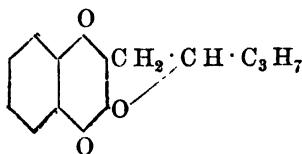
Abietic Acid. H. Mach. (*Chemiker Zeitung*, xvii. 436.) The author has redetermined the composition and molecular weight of

this acid obtained from colophony, and has obtained numbers indicating that the correct formula for the pure acid is $C_{19}H_{23}O_3$.

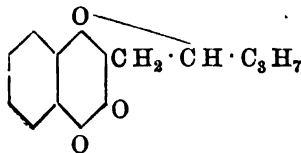
The Constitution of Lapachic Acid (Lapachol) and its Derivatives. S. C. Hooker. (*Proc. Chem. Soc.*, No. cxiii.) Lapachic acid is found in a crystalline state in the grain of a number of South American woods, the lapacho tree, from which it derives its name, growing plentifully in the Argentine Republic; the author has obtained his material chiefly from Surinam greenheart. Paterno, in 1882, came to the conclusion that lapachic acid (lapachol) was a homonuclear *amylenehydroxynaphthaquinone*, and he subsequently expressed the view that it was an α -quinone derivative, because lapachone, a neutral isomeric substance into which it is converted by sulphuric acid, in his opinion resembled α - rather than β -naphthaquinone. The author shows that although Paterno correctly regarded lapachol as an α -quinone, his reason for doing so was wrong, as lapachone is derived from β -naphthaquinone. He proposes to term lapachone β -lapachone, to distinguish it from the isomeric, pale yellow substance—a true α -quinone derivative— α -lapachone, which is obtained on treating lapachol with concentrated muriatic acid. The nature of the changes involved in the formation of α - and β -lapachones from lapachol is fully discussed in the paper, the formulæ assigned to them being as follows:—



(Lapachic acid) Lapachol.



α -Lapachone.



β -Lapachone.

It is shown that Paterno's isolapachone, in reality, contains less hydrogen than the lapachones, and that it is doubtless a β -naphthaquinone-propyl-furfuran.

Conversion of Maleic into Fumaric Acid, and of Fumaric into

Maleïc Acid. S. Tanatar. (*Journ. Russ. Chem. Soc.*, xxii. 310-313.) On heating an aqueous solution of maleïc acid at 200° C. in a sealed tube for two hours, it is almost entirely converted into fumaric acid. Malic acid is not formed as an intermediate product in this reaction.

Fumaric acid may be completely converted into maleïc acid by heating it with an equal volume of phosphoric acid in a retort. The distilled product is maleïc anhydride, which, after purification by recrystallization from chloroform, can be readily converted into maleïc acid by heating with water.

Isarabic Acid. M. Conrad. (*Ber. der deutsch. chem. Ges.*, xxv. 2446-2448.) The conversion of tartaric acid into isarabic acid by the action of ferrous sulphate has been attributed by Ballo to the reducing effects of the latter. The author's experiments do not support this view, but point to the process being one of dehydration rather than of reduction, as suggested by Scheibler.

The Oxidation of Tartaric Acid in Presence of Iron. H. J. H. Fenton. (*Proc. Chem. Soc.*, No. 123.) If a small quantity of hydrogen peroxide be added to a solution of tartaric acid containing a trace of ferrous salt, a yellow colour is produced which changes to violet on adding alkali; an excess of the peroxide must be avoided. As other organic acids do not behave in this manner, the interaction may be utilised in detecting tartaric acid. The violet colour is discharged by acids, sulphuric acid producing a transient green coloration, and is reproduced by alkali.

The compound which gives the colour with ferric salts is crystalline, and appears to be represented by the formula $C_2H_2O_3$. It is best obtained by dissolving tartaric acid in a limited quantity of boiling water, and then adding about $\frac{1}{10}$ of its weight of reduced iron; the liquid is then heated until clear. After the solution has been well cooled, hydrogen peroxide is carefully added drop by drop, the temperature being maintained constant until the liquid is nearly black; slightly hydrated phosphoric oxide is next added in small quantities at a time, the mixture being still well cooled, and finally the compound is extracted with ether. The ether is then distilled off, and the residue mixed with cold water; the resulting white powder is washed with a small quantity of cold water. The compound is a powerful reducing agent, and behaves as a ketone with phenylhydrazine, hydroxylamine, and hydrogen cyanide. The author is further investigating the properties and constitution of the product in question.

Constitution of Angelic and Tiglic Acids. I. Kondakoff. (*Journ. Russ. Chem. Soc.*, xxii. 375-330, and xxiii. 178-217.) The author adduces a number of observations in support of the formulæ $\text{CH}_2\text{:CH}\cdot\text{CH Me}\cdot\text{COOH}$ and $\text{CH}_3\cdot\text{CH}\text{:C Me}\cdot\text{COOH}$ for angelic and tiglic acids respectively. He also arrives at the conclusion that angelic acid is not α -ethylacrylic acid, but α -methylisocrotonic acid, and that the isomerism between angelic and tiglic acids is occasioned by a structural difference between them, and is not a case of geometrical isomerism.

Angelic and Tiglic Acids. H. P. Talbot. (*Technol. Quart.*, v., Nos. 1 and 2.) This essay consists of a summary of the various investigations on angelic and tiglic acids, and an index (both of authors and subjects) to the literature of the subject from 1842 to 1892.

Presence of Myristic Acid in Ox Bile. M. Lassar-Cohn. (*Ber. der deutsch. chem. Ges.*, xxv. 1829-1835. From *Journ. Chem. Soc.*) In the preparation of cholic acid by the Mylius method, the foreign acids are separated by precipitation with barium chloride in a solution containing 20 per cent. of alcohol. The author has examined the mixed barium salts so obtained, and has separated from them myristic, palmitic, stearic, and oleic acids. He finds about 0.004 per cent. of myristic acid calculated on the bile taken.

The following method of separation was employed:—The mixed barium salts from 100 litres of bile are boiled with water (6 litres) and sodium carbonate (400 grams). The mixture is filtered, the filtrate evaporated to dryness, the residue extracted with alcohol, and the alcoholic solution evaporated to dryness. 100 litres of bile yield 480 grams of the crude sodium salts. The sodium salts are dissolved in water and fractionally precipitated with barium acetate. The successive separations of barium salts are severally decomposed with hydrochloric acid, and the fatty acid separated from the aqueous liquor, dissolved in 90 per cent. alcohol, a little ammonia added, and fractionally precipitated with a 10 per cent. solution of magnesium acetate. The magnesium salts are decomposed with hydrochloric acid, and the free fatty acid crystallized from 70 per cent. alcohol.

The pure magnesium salt of the myristic acid may be more readily obtained by completely precipitating the crude sodium salts with barium acetate, decomposing the mixed barium salts with hydrochloric acid, and fractionally precipitating the acids so obtained with magnesium acetate in alcoholic solution.

The Acids of Ox Bile. M. Lassar-Cohn. (*Ber. der deutsch. chem. Ges.*, xxvi. 146-151.) It has been previously shown that cholic acid is associated in ox bile with myristic, palmitic, stearic, and oleic acids (see preceding abstract). In addition to these, choleic acid, $C_{24}H_{40}O_4$, is present, which the author obtained from the bile to the extent of 0.08 per cent., which is little more than one-half of the proportion obtained by Latschinoff in ox bile from St. Petersburg. The author gives the percentages of the various acids in bile as follows:—Cholic acid, 4.790; choleic acid, 0.085; myristic acid, 0.004; resinous acids, 0.120; stearic, palmitic, and oleic acids, together 0.146, loss 0.050.

Ricinoleic and RicinelaIdic Acids. K. Mangold. (*Monatshefte*, xiii. 326-329.) The view expressed by Hazura and Grüssner that ricinoleic acid is not a single substance, but a mixture of two acids, is not shared by the author, who considers that the formation from it of two distinct hydroxystearic acids by oxidation is better explained by the assumption that a single acid gives rise to two stereoisomeric oxidation products. He further finds that ricinelaIdic acid, when oxidized with alkaline potassium permanganate, likewise yields two distinct and well-characterized acids.

Chrysophanic Acid. V. Grandis. (*Chem. Centralbl.*, 1892, 592-593.) Chrysophanic acid prepared by the author from chrysarobin in accordance with Liebermann's directions proved to be identical in nearly all its properties with the product described by that chemist. It showed, however, a notable inconstancy in its melting-point, the numbers obtained varying between 162° and $187^{\circ}C.$, in spite of the fact that the product was repeatedly recrystallized from benzol. The sublimed acid, after recrystallization, was found to fuse at $190-191^{\circ}C.$

Resolution of Lactic Acid into its Optically Active Components. T. Purdie and J. W. Walker. (*Chemical News*, lxvi. 33.) The authors have succeeded in resolving lactic acid into two optically active forms by fractional crystallization of its strychnine salt. The salt of the lævorotatory acid crystallizes out first, being far less soluble than the salt of the dextrorotatory acid.

Succinic Acid as a Product of Fermentation. A. Rau. (*Apotheker Zeitung*, 1892, 411. From *Revue Hygiene*, xiv. 225-242.) The author's researches tend to show that succinic acid is a normal product of alcoholic fermentation, and that, contrary to the conclusion arrived at by Pasteur, its formation does not depend on a

simultaneous production of glycerin, and bears no definite relation to the proportion of glycerin produced. The quantity of succinic acid formed seems to vary according to the more or less energetic action of the yeast-cells. Unlike glycerin, the succinic acid is not diminished by lowering the temperature of fermentation, and it is not increased by the addition of chemical ferment-foods.

Wines were found to contain succinic acid in proportions varying from 0.3 to 1.5 grams per litre.

Oxidation of Cinnamic Acid. R. Fittig and R. Ruer. (*Liebig's Annalen*, cclxviii. 27-32.) The authors have investigated the action of potassium permanganate on cinnamic acid, and find that the chief product of this oxidation is phenylglyceric acid, $C_9H_{10}O_4$. This body does not fuse at $117^\circ C.$, as stated by Anschütz and Kinnicutt, but at $141-142^\circ$. In addition to this product, benzaldehyde, benzoic acid, and oxalic acid are formed.

Improvement in the Manufacture of Salicylic Acid. P. W. Hofmann. (*Pharm. Centralhalle*, 1892, 412.) The author's process renders distillation unnecessary in the preparation of this acid. The crude product is treated with solution of stannous chloride, which precipitates a dark oily mass containing most of the impurities. From the clear supernatant liquid pure salicylic acid is obtained by precipitation with hydrochloric acid and subsequent washing.

Action of Heat on Salicylic Acid. C. Graebe and A. Eichengrün. (*Liebig's Annalen*, cclxix. 323-325.) At a temperature of $195-220^\circ$, salicylic acid is to a large extent converted into phenyl salicylate. If at this stage the product is distilled, a considerable quantity of xanthone is formed.

Salicylacetol. P. Fritsch. (*Pharm. Centralhalle*, xxxiv. 194.) The body introduced under this name is obtained by treating monochloracetone with sodium salicylate, and has a composition corresponding to the formula $CH_3 \cdot CO \cdot CH_2 \cdot O_2C \cdot C_6H_4 \cdot OH$. It forms needle-shaped crystals which fuse at $71^\circ C.$, and are insoluble in cold, slightly soluble in hot water, and freely soluble in chloroform, ether, and warm alcohol.

Benzoparacresol. A. Petit. (*Journ. de Pharm. et de Chim.*, March, 1893, 294.) Benzoparacresol is a crystalline solid of slight ethereal odour, insoluble in water, but very soluble in ether and chloroform, and melting at $70-71^\circ C.$ It is prepared by treating paracresol with sodium benzoate in the presence of oxychloride of phosphorus and crystallizing the product from hot alcohol.

Dulcin (Sucrol), a New Sweetening Agent. (*Apotheker Zeitung*,

1892, 550; *Oesterr. Zeitschr. für Pharm.*, 1893, 261.) The compound introduced as a substitute for saccharin under the name "dulcin," which has subsequently been changed to "sucrol," is paraphenetolcarbamide, $C_6H_4(O C_2H_5) N H C O N H_2$. It was first of all obtained by Berlinerblau in 1883 by a somewhat costly process, and is now prepared from paraphenetidine by the action of ammonia and carbon oxychloride. It is stated to be free from any injurious effects, and to possess a sweetening power of 200 times its weight of cane-sugar. It occurs in the form of minute crystals or of a crystalline powder fusing at $160^{\circ}C.$, soluble in alcohol, ether, and hot hydrochloric and acetic acids. 100 c.c. of water dissolve 0.16 gram at $20^{\circ}C.$, and 0.65 gram at $80^{\circ}C.$ It can be separated from mixtures containing it by shaking with ether and allowing the ethereal solution to evaporate. As a test for its recognition, a minute quantity of the dry substance is heated in a small test-tube with 3 drops of carbolic and the same quantity of sulphuric acid; after cooling, the liquid is well mixed with half a test-tube full of water, and ammonia is then carefully poured upon the surface of the mixture so as to form a distinct layer. A blue ring will thus be produced at the line of contact between the two liquids. The coloration becomes gradually more intense, and finally extends throughout the alkaline liquid.

Guaiacol. A. Béhal and E. Choay. (*Répertoire de Pharm.*, March, 1893, 101.) The author finds that commercial guaiacol is very impure, and usually does not contain more than 50 per cent. of the pure compound. A pure preparation can be obtained by dissolving 58 grams of sodium in 600 grams of methyl alcohol, and adding 270 grams of pyrocatechin, also previously dissolved in methyl alcohol. The mixture is heated to $120-130^{\circ}C.$ with an excess of methyl iodide, then allowed to cool, and the alcohol recovered by distillation. The residue is treated with sodium oxide, and the solution agitated with ether to remove a small quantity of veratrol present. The guaiacol is liberated by means of hydrochloric acid, and then distilled. If the portion passing over at $205-207^{\circ}$ be cooled by means of methyl chloride, the product obtained in crystals consists of pure guaiacol. It is a white solid, crystallizing in prisms, melting at 28.5° and boiling at $205^{\circ}C.$ Its specific gravity at 0° is 1.1534, and at 15° 1.143. It has a sweet and strongly astringent taste.

Creasote. A. Béhal and E. Choay. (*Comptes Rendus*, cxvi. 200. From *Pharm. Journ.*) Commercial creasotes are found to be

mixtures of very variable composition. Their analysis may be effected by taking advantage of the facts that—(1) hydrobromic acid removes methyl from the methyl ethers of the phenols, (2) that monophenols can be removed by steam, (3) that polyphenols cannot be thus removed, (4) that ether abstracts from aqueous solutions pyrocatechin and homopyrocatechin as well as monophenols, and (5) that pyrocatechin and homopyrocatechin are separable by benzene. In carrying out the process a current of hydrobromic acid is passed into creasote mixed with some water, by which proceeding the ethers of polyphenols are demethylated. By distillation with steam the monophenols are carried over and can be separated from the distillate by shaking with ether.

Pyrogallol. P. Cazeneuve. (*Comptes Rendus*, cxiv. 1485.) Gallic acid, when combined with aniline, is converted into pyrogallol at a very much lower temperature than when heated alone. The author bases upon this observation a simple method for the preparation of pyrogallol in a high state of purity. The combination of gallic acid with aniline is heated to 120° C., until the evolution of carbonic anhydride ceases; on cooling, aniline pyrogallate crystallizes in long needles, which only require to be treated with benzol to remove the whole of the aniline and to leave the pyrogallol in a very pure condition. After recrystallization the product melts at 132° C. Older statements give the melting-point of pyrogallol as 115° C.

Origin of Resins and Tannins. E. Heckel and F. Schlagdenhauffen. (*Comptes Rendus*, cxiv. 1291. From *Pharm. Journ.*) The authors have made some observations on plants belonging to the genera *Gardenia* and *Spermolepis*, which tend to show that there is a close relationship chemically between resinous matters and tannins, certain resins recently examined by them having shown a manifest transition between these two categories of natural compounds. In certain species of *Gardenia*, natives of New Caledonia, a resinous substance protecting the leaf buds occurs in abundance, and is employed by the natives for a variety of medicinal and economic purposes. An elementary analysis of this substance gave figures which disclosed remarkable differences when contrasted with those furnished by other resins, such as copal, myrrh, sandarac, etc.; and, when compared with the results of the analysis of different kinds of tannins, there was a remarkable resemblance. The resin accords most completely in its constitution with cinchotannic acid, and it is noteworthy in this connection that the *cinchonas* and the *Gardenias* both belong to

the *Rubiaceæ*. In spite of the considerable differences in physical properties, in solubility, in molecular state, and density, there would thus appear to be a sufficiently great analogy in the constitution of this resinous matter and tannin to allow of the supposition of a veritable community of origin. A similar fact was disclosed in the examination of an abundant excretion from the *Spermolepis gummifera*, which the authors suggest would be more correctly named *S. tannifera*. This is a tanno-resinous substance formed in the wood at the expense of some of the ligneous cell-walls. It contains about 80 per cent. of gallo-tannic acid, and the resin present is closely akin to tannin in its constitution. Apparently, therefore, this forms a connecting-link between the tannins and resins.

Chestnut Tannin. H. Trimble. (*Chem. News*, lxxvii. 7, 8.) 7.31 per cent. of tannin were obtained from the bark, and 7.85 from the wood of the chestnut. The bark tannin extracted by ether was darker than that from the wood; but after thorough purification, both proved to be identical.

Canaigre Tannin. H. Trimble and J. C. Peacock. (*Amer. Journ. Pharm.*, April, 1893, 161-169.) Canaigre is the tuberous root of *Rumex hymenosepalus*, a plant growing abundantly in the sandy soil of Texas, New Mexico, and Arizona. The tannin isolated from it by the authors has the following percentage composition:—C=58.10, H=5.33, O=36.57. It appears to belong to a group of which the tannins from mangrove and rhatany are typical representatives. A full description of this tannin and of its decomposition products is given in the paper.

Chlorophyll. H. Molisch. (*Nature*, No. 1185, 255.) The author denies the accuracy of the statement that iron is an invariable constituent of chlorophyll. He finds it to occur in organic combination both in the walls and contents of cells, but not in living protoplasm. He has never been able to find a trace of iron in the ash of pure chlorophyll.

Further Researches on Chlorophyll. E. Schunck. (*Proc. Roy. Soc.*, l. 302-317. From *Journ. Chem. Soc.*) When the residue obtained by evaporating to dryness a solution of phyllocyanin in aqueous potash is heated nearly to fusion, it suddenly turns brown. The aqueous solution of the mass, on treatment with acetic acid, gives a bulky, brown precipitate, which is ultimately obtained in lustrous, plum-coloured needles. It is soluble in concentrated hydrochloric acid, glacial acetic acid, chloroform, ether, or boiling alcohol, and insoluble in carbon bisulphide. The

time decanting off the solution of carotin, the author obtains a purified green pigment, which gives only the first four absorption bands and a continuous absorption in the extreme violet. The cyanophyll spectrum of Kraus is, therefore, a combined spectrum of the pure green pigment and carotin. The pure green pigment does not crystallize. Heated with hydrochloric acid, it yields pure brown-yellow chlorophyllane with absorption bands I., IV.a, IV.b, II., III., and an absorption in the extreme violet; flocks of pure phyllocyanin are also formed.

The alcoholic extract of certain plants does not behave as above described; the benzene or light petroleum may take only the carotin, leaving the green pigment and xanthophyll in the alcohol. In this case the author speaks of an "inferior green pigment," yielding with hydrochloric acid "inferior chlorophyllane" and "inferior phyllocyanin." This inferior green pigment crystallizes in tetrahedra, hexagonal plates, and stars, but oftenest in a very irregular manner. The pure crystals, appearing to the eye as a dark-brown, almost black, powder, are identical with the chlorophyll crystals which Borodin obtained by moistening microscopic sections with alcohol and allowing them to dry. They are easily soluble in alcohol, insoluble in light petroleum, carbon bisulphide, and commercial benzene, but soluble in pure benzene (this explains the contradiction between Tschirch and Borodin). The alcoholic solution is fluorescent; its spectrum has absorption bands I. to IV., and possibly bands between F and H. The band IV.b is entirely absent, from which one must conclude that chlorophyllane is not present, as Tschirch believed.

The author concludes that living leaves contain only the inferior green pigment. Treatment of the leaves with boiling water, however, nearly always transforms the inferior green into the superior. This transformation can only be effected in the leaves themselves, for the crystals of inferior green pigment do not yield the superior when boiled in alcoholic solution.

Influence of Phosphoric Acid on the Formation of Chlorophyll. O. Loew. (*Bot. Centralbl.*, xlviii. 371.) The results of the author's experiments support the view that, like iron, phosphoric acid is necessary for the production of normal chlorophyll.

Further Notes on Madder Colouring Matters. E. Schunck and L. Marchlewski. (*Proc. Chem. Soc.*, No. 126.) Many years ago one of the authors described under the name of rubiadin a yellow colouring matter obtained from madder. It is now shown that madder contains a glucoside of this substance, the

preparation and properties of which are described. The glucoside crystallizes in yellow needles melting at about 270° . On acetylation by Liebermann's method, it yields a pentacetyl derivative. On treatment with baryta water, it yields a dark red lake, one hydrogen atom being displaced by barium. On hydrolysis, it is converted into rubiadin and ordinary dextrose, $C_{21}H_{20}O_9 + H_2O = C_{15}H_{10}O_4 + C_6H_{12}O_6$.

Rubiadin crystallizes in lustrous, yellow needles melting at 290° . It very closely resembles purpuroxanthin, and is probably the corresponding derivative of methylantracene.

Indigo-Green. V. H. Soxhlet. (*Chem. Zeit.*, xv. 913-914.) If commercial indigo extract be mixed with a large excess of ammonia, and the mixture kept in securely corked bottles for about ten days, a yellowish-green colouring matter is formed resembling Berzelius' viridinesulphonate. This indigo-green appears to consist of two distinct colouring matters, a yellow and a green one. After slight acidification with dilute sulphuric acid and treatment with salt brine, it is suitable for wool-dyeing.

Products from Indigo-Blue. C. O'Neill. (*Chem. News*, lxx. 124; *Journ. Chem. Soc.*, August, 1892.) When pure indigo-blue is treated with 20-30 times its weight of glacial acetic acid, and gradually with about $\frac{1}{2}$ its weight of permanganate or a corresponding quantity of lead or manganese peroxide, the mass thickens, the blue disappears, and by filtering, washing, and drying in a vacuum, or at $20-25^{\circ}$ in the air, a crystalline substance is obtained in quantities amounting to 140 per cent. of the indigo used; this the author terms "oxyacetindigotin." This compound is insoluble in all solvents; is permanent in dry air and, in the cold, in most neutral, acid, and oxidizing agents, but is attacked by alkalis and decomposed by heat, yielding in the presence of moisture, acetic acid, isatin, indigo, and an oxidized product, crystallizing from chloroform in silky, golden-yellow crystals, slightly soluble in water, and, unlike isatin, soluble in carbon bisulphide. In dry heat, oxyacetindigotin loses 31-32 per cent. of its weight, and is resolved into glacial acetic acid, indigo, and a resinous substance soluble in chloroform. With sodium hydrate in the cold, oxyacetindigotin yields indigo, sodium acetate, and a salt of an acid, indigotic acid, $C_{23}H_{28}N_4O_{13}$, which separates from alcohol in brilliant crystals; it can also be crystallized from hot water, although 1000 parts of cold water are required for its solution. It decomposes at 240° , yielding, among other products, aniline. It is polybasic, and, of two sodium salts,

$C_{33}H_{26}Na_3N_4O_{13}$ and $C_{33}H_{27}NaN_4O_{12}$, the former is very soluble and not crystalline, the latter is less soluble and crystallizes well from water. When heated with glacial acetic acid, oxyaceto-indigotin is decomposed into acetic acid, indigo, and brilliant, yellow crystals, containing a new substance of the composition C_3H_3NO .

Constituents of Gutta-Percha. O. Oesterle. (*Amer. Journ. Pharm.* From *Archiv der Pharm.*, 1892, 641.) (1) *Gutta*, a white, amorphous hydrocarbon $(C_{10}H_{16})_n$, melting at $53^\circ C.$, soluble in chloroform, carbon bisulphide, fixed and volatile oils, and in hydrocarbons altered by light and air, forming a yellow, friable mass partly soluble in alkalies and alcohol, and incompletely soluble in the first-mentioned solvents. (2) *Alban*, $C_{40}H_{64}O_2$, melts at $195^\circ C.$, is soluble in hot alcohol (upon cooling separates in small, lustrous scales) and the usual solvents, but insoluble in water and alkalies; upon heating with alcoholic potassium hydrate solution, it yields a hydrocarbon, *albene*. (3) *Fluavil*, friable, yellow, amorphous $(C_{10}H_{16}O)_n$, melts at $82-85^\circ C.$; it has the same solubilities as alban. (4) *Guttan*, an unstable compound, in many respects resembling gutta. These constituents obtained from an authentic sample of gutta-percha from Payena Leerii are identical with those obtained from the commercial article. Of the constituents, *gutta* is the one showing the characteristic plasticity of gutta-percha; alban does not interfere in the value of the gutta-percha, while the presence of any considerable quantity of fluavil makes it brittle. All of these substances are indifferent to the ordinary chemical reagents; but the alteration of the gutta and guttan by exposure to light and air, also to electrical influences, causes a deterioration of the gutta-percha, although it is not possible to say at present if these decomposition products are related to fluavil and alban.

Spontaneous Conversion of Isoprene into Caoutchouc. W. A. Tilden. (*Chem. News*, lxxv. 265.) The author observed that some isoprene, prepared from turpentine, and stored in bottles, changed spontaneously into india-rubber, the liquid being at the same time acid, and still containing some unchanged isoprene. The presence of a small quantity of acetic or formic acid produced by atmospheric oxidation is suggested as a possible cause of this change.

Terpenes from Resins. O. Wallach and T. Rheindorff. (*Liebig's Annalen*, cclxxi. 308-311.) The volatile products obtained in the distillation of copal, olibanum, and colophony contain

pinene and dipentene. The distillate from elemi contains dextrophellandrene.

Terpin Hydrate from Eucalyptus Oil. E. Merck. (*Archiv der Pharm.*, ccxxx. 169-173.) The author finds that eucalyptus oil, when mixed with nitric acid and alcohol, causes the gradual formation of the same terpin hydrate which Wallach obtained under the same conditions from oil of turpentine.

Citronellic Aldehyde. E. Kremers. (*Amer. Chem. Journ.*, xiv. 203-212.) The substance employed by the author in his investigations was the so-called *citronellon*, from the oil of *Eucalyptus maculata*, var. *citriodora*, and was supplied by Schimmel of Leipzig. The oil was distilled under a reduced pressure of 15 mm., and the larger portion, which came over between 195° and 220°, was collected apart. It had a specific gravity of 0.875 at 21°, and showed a rotatory power of $[\alpha]_D = +6.81^\circ$. On analysis numbers were obtained corresponding with the formula $C_{10}H_{18}O$, which is also in harmony with the general behaviour of the substance.

Citronellic aldehyde is an unsaturated compound and readily absorbs bromine in the ratio $C_{10}H_{18}O : Br_2$, but the additive product is so unstable that it cannot be obtained in a crystalline condition. With sodium hydrogen sulphite, the crystalline solid, $C_{10}H_{18}O, NaHSO_3$, was formed, and from it the aldehyde was again liberated on treatment with sodium carbonate.

Citronellic aldehyde appears to form an oxime with hydroxylamine hydrochloride, but the compound was not isolated in a crystalline form. No satisfactory condensation product was obtained with phenylhydrazine. On oxidation with ammoniacal silver oxide, the aldehyde yields an acid which forms a by no means characteristic silver salt, $C_{10}H_{17}O_2Ag$; whilst, with permanganate, it produces, in addition to oxalic and formic acids, two acids, the salts of which were not obtained in a sufficiently pure state to enable their composition to be determined.

Citrene. (*Schimmel and Co.'s Report*, April, 1893.) The substance referred to under this name consists of the terpenes of oil of lemon obtained as a bye-product in the preparation of citral (see *Year-Book of Pharmacy*, 1892, 175). It is spoken of as a likely adulterant of oil of lemon.

Action of Sulphuric Acid on Citrene. G. Bouchardat and J. Lafont. (*Comptes Rendus*, cxv. 1083-1085.) The authors have studied this action, and find that it results in the formation of

inactive polymers of this hydrocarbon, the most abundant of which is *diterpene*, $C_{20}H_{32}$.

Pinene. O. Wallach. (*Liebig's Annalen*, cclxviii. 210-216.) In this paper the author defends his constitutional formula of pinene against the criticisms of Wagner, and contends that it is the best representation of the constitution of this body that can be given in the present state of knowledge.

Menthene. A. Reissert and A. Junghahn. (*Ber. der deutsch. chem. Ges.*, xxv. 2698-2700.) Menthene can be prepared in a pure state by heating menthol with twice its weight of potassium bisulphate in a reflux apparatus at 180-200° C. for nearly 8 hours, then distilling the product with steam, and fractionating the resulting oil. The portion boiling at 167-168° is pure menthene, and forms a thin colourless dextro-rotatory liquid of 0.814 specific gravity (at 20° C.), and a peculiar odour unlike that of menthol. The author describes a nitrosochloride of menthene of the formula $C_{10}H_{18}NOCl$.

The Camphor Group. U. Alvisi. (*Gazz. Chim. Ital.*, xxii. 265-275; *Journ. Chem. Soc.*, November, 1892.) An attempt made to prepare a cyanhydrin from camphor was unsuccessful, hydrogen cyanide having no action on camphor either at the ordinary temperature or at 60-80°, or even when in the nascent condition. The monobromocamphor, melting at 144°, prepared by Cazeneuve by the action of hypobromous acid on camphor, could not be isolated, the product of the reaction after purification containing 6 to 11 per cent. of bromine. On boiling α -dibromocamphor with concentrated aqueous potash, it is in great part converted into the monobromocamphor melting at 76°. It further appears that in the conversion of α -dibromocamphor into monobromocamphor by heating it with potassium permanganate in alkaline solution, the action of the permanganate is quite secondary, being limited to the formation of some resinous and other bye-products.

Oxidation Products of Camphoric Acid. L. Balbiano. (*Chem. Centr.*, 1892, 612.) When camphoric acid is oxidized in alkaline solution by means of potassium permanganate, oxalic acid is formed, together with a new acid of the composition $C_9H_{16}O_6$.

Notes on Essential Oils. Schimmel and Co. (*Report for April, 1893*.) Notices of the following appear in this report:—The oils of camphor, cassia, bergamot, lemon, sweet orange, pine needle, geranium, guaiacum wood, lavender, and bitter almonds. For particulars, reference should be made to the original report or

to a copious extract from the same in *Pharm. Journ.*, 3rd series, xxiii. 849-850 and 867-868.

Essential Oils. Schimmel and Co. (*Zeitschr. für analyt. Chem.*, xxi. 357-358.) *Oil of Lavender.*—The true oil contains no camphor, and but traces of substances of low boiling-point. Cineole, which occurs in considerable proportions in oil of *Lavandula spica*, is likewise absent from the true oil, the chief constituents of which are an alcohol, $C_{10}H_{18}O$, identical with Semmler's linalool, and its acetate. The alcohol boils at $197-199^{\circ}$, and has a specific gravity of 0.878 at 15° . Heated with dehydrating agents, it yields dipentene and terpinene, also other products. On oxidation, it yields geranaldehyde ("citral"), whose sp. gr. is 0.8972; refractive index, 1.490. Geranaldehyde is converted by dehydrating agents into cymene. Linalool absorbs 4 atoms of bromine; with hydrogen chloride it yields a liquid of the composition $C_{10}H_{18}Cl_2$. Acid anhydrides produce the corresponding ethers, which are substances of agreeable odour. The acetate occurs to the extent of 40 per cent. in oil of bergamot, and has the characteristic odour of that oil.

Thoms' method of valuing oil of cloves affords results agreeing within 1 per cent. On the other hand, Panajotow's proposal for the detection of geranium oil in oil of rose, by means of a magenta solution decolorized by sulphurous acid, is found to be useless.

Oil of Sandal-Wood. R. A. Cripps. (*Pharm. Journ.*, 3rd series, xxiii. 461-462.) The author's results, which are fully detailed in the paper, induce him to suggest that the official description of the characters and tests of this oil should be modified as follows:—"Thick in consistence, pale yellow or nearly colourless, possessing a strongly aromatic odour, a pungent and spicy flavour, and a neutral or slightly acid reaction. Its specific gravity should not be below .970. At $60^{\circ}F.$ ($15.5^{\circ}C.$) it forms a clear or at most a faintly opalescent solution with five times its volume of a mixture of five fluid parts of rectified spirit with one fluid part of distilled water. It rotates the plane of polarization of a ray of polarized light strongly to the left. Two drops of the oil added to six drops of nitric acid, sp. gr. 1.5, on a white tile, should give a yellow to bright reddish-brown coloration, without any green, indigo, or violet tint at the edges during five minutes. For complete saponification in alcoholic solution, it requires not more than 1 per cent. of potassium hydrate."

The author considers it is not improbable that further experience may show these tests to be not sufficiently restrictive, for

though they would detect comparatively small additions of cedar-wood, copaiba, and castor oils, or of oil of turpentine, they would fail in the case of small quantities of West Australian or West Indian sandal-wood oils.

Test for the Purity of Oil of Sandal-Wood. E. Mesnard. (*Comptes Rendus*, cxiv. 1546-1547.) Pure oil of sandal-wood, when mixed with concentrated sulphuric acid, forms a viscous liquid which becomes pasty and rapidly changes to a pale bluish-grey or greyish solid mass which adheres strongly to glass. In the presence of an admixture of oil of cedar, cubeba, copaiba, or turpentine, the mixture does not completely solidify, and remains of a deep tint with a distinct lustre.

Assay of Oil of Mustard. A. Schlicht. (*Zeitschr. für analyt. Chem.*, xxx. 661-665.) The author recommends the following modification of the method of Dircks:—The mustard oil is shaken for some time in a corked flask with a mixture of 20 parts of potassium permanganate and 5 parts of potassium hydrate (both of which must be free from sulphates), and the mixture is finally heated nearly to boiling. The whole of the sulphur is thus oxidized to sulphuric acid. After slight cooling, 5 c.c. of alcohol are added for every gram of permanganate used. This completes the precipitation of the manganese present. The mixture is completely cooled, largely diluted, made up to a known volume, and filtered. A measured portion of the filtrate is slightly acidified with hydrochloric acid, and treated with a solution of iodine in potassium iodide until a feeble yellow colour remains even after warming. This reproduces any sulphuric acid which has been reduced by the aldehyde, and also removes the aldehyde itself. The sulphuric acid is now determined by barium, and the weight of barium sulphate multiplied by 0.42492 gives the amount of mustard oil.

Oil of Star-Anise. (*Schimmel and Co.'s Report*, April, 1893.) The portion of this oil distilling at 157-170° C. is found by the authors to consist of two terpenes, one of which is lævo-phellandrene, boiling at 170-175°, while the other is dextropinene, boiling at 157-163°. The former has an optical rotation of -5° 40', and the latter +21° 30', both in a 100 mm. tube.

The Oils of Lavender and Bergamot. J. Bertram and H. Walbaum. (*Journ. prakt. Chem.*, xlv. 590-603.) The main constituent of French oil of lavender is an alcohol of the formula $C_{10}H_{18}O$, identical with Semmler's "linalool" (see *Year-Book of Pharmacy*, 1892, 71). It is associated in the oil with its acetate and

other ethereal salts. On oxidation with potassium bichromate and sulphuric acid, this alcohol yields citral (geranaldehyde, see *Year-Book of Pharmacy*, 1892, 175). The acetate derived from linalool is also contained in oil of bergamot, which owes its odour to this constituent.

The Essential Oil of *Melaleuca Viridiflora*. G. Bertrand. (*Comptes Rendus*, cxvi. 1070.) The leaves of this New Caledonian plant, belonging to the *Myrtaceæ*, yield about 2.5 per cent. of a pale yellow, dextro-rotatory volatile oil, having a specific gravity of 0.922, and an odour resembling that of oil of cajeput. It contains traces of valerianic acid, valerianic ether, and benzoic aldehyde. Its principal constituents are shown by the author to be a dextro-rotatory terebenthene, $C_{10}H_{16}$, eucalyptol, a hydrocarbon (probably citrene) boiling at $175^{\circ}C.$, and a terpeneole.

Pine Oil. Schimmel and Co. (*Pharm. Journ.*, 3rd series, xxiii. 342.) The authors have examined several samples of the oil met with in commerce, comparatively with an undoubtedly genuine sample, and have found that in some instances the commercial oil was nothing more than ordinary turpentine scented with acetic ether, or mixed with a small proportion of true pine oil. The genuine oil differs from these imitations in containing a considerable portion of oil boiling above 185° . This cannot be distilled without decomposition, except by the aid of steam, and it is considered to be of the nature of an ester, to which the oil owes its agreeable smell. The portions of highest boiling-point yielded on saponification lævo-borneol, having a melting-point of 206° , and fat acids, chiefly acetic. Another constituent of the genuine oil is lævo-pinene, while the spurious oil yields dextro-pinene, thus showing that it has been prepared with American turpentine. The oil of *Pinus Picea* and that of *Abies canadensis*, resemble genuine pine oil in containing lævo-borneol and lævo-pinene. The former also contains limonene. Another oil, said to be obtained from the green cones of *Abies excelsa*, did not contain borneol, but consisted almost entirely of lævo-pinene and lævo-limonene. By fractional distillation the great difference of commercial samples may be ascertained, as will be seen from the following tabular statement of results obtained in that way. The genuine oil yields only a small portion distilling under 170° (lævo-pinene), and there remains a considerable portion boiling above 185° , consisting chiefly of borneol acetate and other esters of borneol. Lævo-limonene must also be regarded as an essential constituent of pine oil.

The quantitative results of the authors' examination are given in the following table:—

	160°-170°	170°-185°	Residue.
GENUINE PINE OIL.			
From <i>Picea vulgaris</i> , Lk., sp. gr. 0.938 at 15°, rotatory power -28° . . .	17 p.c.	33 p.c.	50 p.c.
<i>Pinus Picea</i> , sp. gr. 0.875 at 15°, rotatory power -58.40°	8 „	55 „ cont'd. limonene.	37 „
<i>Abies canadensis</i> , L., sp. gr. 0.907 at 15°, rotatory power -20.54° . . .	11 „	37 „	52 „
<i>Pinus Pumilio</i> , Haenke, sp. gr. 0.865 at 15°, rotatory power -9°	0 „	70 „	30 „
<i>Abies excelsa</i> , Lk., sp. gr. 0.854 at 15°, rotatory power -72.40° . . .	16 „	76 „ cont'd limonene.	8 „
COMMER. SAMPLES.			
I. rotatory power +14°	96 „	1 „	3 „
II.			
sp. gr. 0.873 at 15°, rotatory power +4°	95 „	1 „	4 „
III.			
sp. gr. 0.868, optically inactive . .	100 „	—	—

contained
borneol.

Essential Oil of Licari Kanali. P. Barbier. (*Comptes Rendus*, cxiv. 674-675.) This oil was found by Morin to contain a substance, $C_{10}H_{18}O$, which the present author terms *licareol*. It is a colourless, somewhat oily liquid, which boils at 199-200°, and has a sp. gr. of 0.8819 at 0°, and 0.8662 at 15.4°. Its rotatory power at 15.4° is $[\alpha]_D = -18^\circ 21'$, and its refractive indices at the same temperature are 1.4635 for the red, and 1.4775 for the blue rays. It is energetically attacked by a mixture of potassium bichromate and sulphuric acid, and among the products of oxidation a ketone, *licareone*, $C_{10}H_{16}O$, occurs as a liquid of penetrating odour and 0.8913 sp. gr. at 0°, boiling at 188-190°, and reducing alcoholic solutions of ammonio-nitrate of silver.

The Essential Oils of Garlic and Onion. F. W. Semmler. (*Archiv der Pharm.*, ccxxx. 434-448.) The author finds that neither of these two oils contains allyl sulphide nor any sesquiterpene.

Oil of garlic (*Allium sativum*) contains 60 per cent. of *diallyl bisulphide*, $S_2(C_3H_5)_2$; about 6 per cent. of *allylpropyl bisulphide*, $C_3H_5S \cdot S \cdot Pr$; 20 per cent. of a fraction passing over between 112 and 122°, and having the empirical formula $C_6H_{10}S_3$; and about

10½ per cent. of a fraction boiling above 122°C., and corresponding to the formula $C_6H_{10}S_4$.

Oil of onion (*Allium Cepa*). The chief fraction of this oil boils at 75–83°C., and has a composition answering to the formula $C_6H_{12}S_2$. From the fractions boiling above 100° a substance was isolated apparently identical with one of the compounds obtained from oil of asafœtida. The residue boiling above 125°C. contains higher sulphides.

Oil of Thuja. O. Wallach. (*Liebig's Annalen*, cclxxii. 99–122.) The fraction of this oil boiling between 160° and 190°C. contains pinene, that boiling between 190° and 200°, which constitutes the bulk of the oil, consists of a mixture of *levo-fenchone*, $C_{10}H_{16}O$, and *thujone*, $C_{10}H_{16}O$, which can be separated by repeated fractional distillation. The fraction boiling above 200°C. has not yet been investigated.

Calcium Oxalate in the Bark of Trees. G. Kraus. (*Ann. Agron.*, xviii. 271–272.) The author has experimented with the barks of various trees containing notable quantities of calcium oxalate, and has determined the proportion of the latter in each case at different times of the year. He arrives at the conclusion that the oxalate is not an excretion but a reserve deposit, which is redissolved in spring and summer according to the needs of the plant.

Presence of Boron, Lithium, and Copper in Plants. N. Passerini. (*Staz. Sper. Agrar.*, xx. 471–476, and xxi. 565–573.) The author has detected boron and lithium in the leaves, and copper in the rhizomes of *Iris germanica*, and all the three elements named in the stems of tomatoes.

Boric Acid as a Normal Constituent of Hops and Beer. J. Brand. (*Zeitschr. für das ges. Brauw.*, 1892, xv. 427.) The author finds that boric acid occurs normally in beer, and that it emanates from the hops. It is not contained in barley or malt, but in every variety of hops. 100 c.c. of beer or 5 grams of hops suffice for its detection.

Tea. Y. Kozai. (*Bied. Centr.*, 1892, 488–489.) The proportion of theine and of total nitrogen in tea-leaves from shrubs growing in full light is much greater than that found in the leaves after excluding the light from the shrubs for several weeks. The different age of the plants, under otherwise equal conditions as to locality, soil, light, etc., seems to effect no definite variation in the composition. The exclusion of light from the shrub is found to have no influence on the proportion of tannin.

Crystallized Vegetable Proteids. T. B. Osborne. (*Amer. Chem. Journ.*, 662-689.) The author describes a number of crystallized globulins obtained from Brazil nuts, hemp seed, castor-oil beans, flax seed, oats, and squash seeds. For particulars the original should be consulted.

A Digestive Ferment in *Cucumis Utilissimus*. J. R. Green. (*Annals of Botany*, July, 1892, 195; *Pharm. Journ.*, 3rd series, xxiii. 85-86.) The author has examined the fruit of the Kachree gourd, *Cucumis utilissimus*, and finds that it contains in the juice and pericarp a proteohydrolytic ferment, capable of dissolving coagulated egg albumen. This ferment is either of the nature of globulin or associated with a globulin in the cells of the plant. Like papain, it acts best in a slightly alkaline medium, less readily in a neutral one, and least of all in the presence of acid. It resembles papain, too, in effecting a very complete decomposition of the albumen, giving rise to peptone, and later to leucin. It is therefore a ferment allied to the trypsin rather than to the pepsin of the animal organism.

The Fermentation of Arabinose by *Bacillus Ethaceticus*. P. F. Frankland and J. MacGregor. (*Proc. Chem. Soc.*, No. cxiv.) The products are qualitatively the same as were obtained in the fermentations of glycerol by the same organism, consisting of ethyl alcohol, acetic acid, carbon dioxide, hydrogen, and traces of succinic acid, together with another acid, which was not identified, although its carbon dioxide equivalent was determined. When, however, the fermentation is conducted in a space closed by a mercury seal instead of cotton wool, a notable proportion of formic acid also occurs amongst the products. The carbonic anhydride and hydrogen are evolved in equimolecular proportions. When the fermentation is conducted in a closed space, the products are formed approximately in the proportions $3\text{C}_2\text{H}_6\text{O} : 3\text{C}_2\text{H}_4\text{O}_2 : 4\text{CH}_3\text{O}_2$, the formic acid, as well as the carbon dioxide and hydrogen found, being all collected together as formic acid in this statement. In the fermentations conducted in flasks plugged only with cotton wool, on the other hand, the alcohol and acetic acid were in the proportion $2\text{C}_2\text{H}_6\text{O} : 3\text{C}_2\text{H}_4\text{O}_2$. It appears, therefore, that in the fermentation of arabinose by *Bacillus ethaceticus* the proportion of acetic acid to alcohol is greater than in that of dextrose, and still greater than in that of mannitol and glycerol, but less than in that of glyceric acid.

Fat-decomposing Ferments in Plants. W. Sigmund. (*Bied. Centr.*, xxi. 350.) The experiments were made with oily seeds,

chiefly rape. The ferments soluble in water and glycerin, but insoluble in alcohol, were dried at 30°, and mixed to an emulsion with weighed amounts of fatty oils. In twenty-four hours, titration with decinormal alkali showed a distinct increase of free acid. The action of the ferment is similar to that of the pancreas ferment. Subsequent experiments showed that the co-operation of an organized ferment in the decomposition of the oil is not possible, and the ferment of the seeds showed the characteristic property of all enzymes, being when dry soluble at 100°, but when damp it loses its activity at 80°, so that heated dry seeds gave active, boiled seeds inactive, extracts. Experiments with germinating seeds gave similar results, except that the increase of acid was considerably greater, and that the ferment of the germinated seeds seemed to be more sensitive to heat in the dry state. The ferment has also the power of decomposing alkyl salts, as, for instance, spermaceti, which do not, like glycerides, belong to fats in the narrower sense.

Vegetable Ferments. J. R. Green. (*Pharm. Journ.*, 3rd series, xxiii. 946-949, 970-972, 991-994, 1008-1010, 1030-1033, and 1047-1052.) This is an elaborate and interesting sketch of the literature of this subject which, however, cannot be dealt with in the form of an abstract. We must therefore confine ourselves here to a mere reference to the source given.

Recent Contributions to the Chemistry and Bacteriology of the Fermentation Industries. P. F. Frankland. (Published in the *Journal of the Society of Arts* and reprinted in *Pharm. Journ.*, 3rd series, xxiii. 654-656, 753-756, 775-778, 814-819, 855-860, 873-875, and 939-941.) As it is impossible to deal justly with this elaborate paper in the form of an abstract, we can do no more in this place than to call the reader's attention to it and refer him to the sources given. The paper is copiously illustrated by woodcuts.

The Composition of Butter Fat. MM. Schrodtt and Kenzold. (*Chem. Repert.*, xx. 228. From *Pharm. Journ.*) The authors have, during a whole year, made continuous examinations of the butter obtained from more than two hundred cows. From their observations they conclude that—(1) the amount of volatile acids is determined by the period of lactation, and is not affected by the feeding: as the period of lactation advances, there is a gradual diminution of the volatile acids; (2) generally a low amount of volatile acids is accompanied by a high amount of insoluble fat acids, causing increase of the refraction exponent; (3) the low

amount of volatile acids is sometimes due to causes that are still unexplained; (4) in consequence of the possible low amount of volatile acids, the determination of that factor is insufficient, and it must be accompanied by the determination of insoluble fat acids, as well as the refraction exponent.

Koumiss. G. Sharp. (*Pharm. Journ.*, 3rd series, xxiii. 512-517.) In this essay the author deals with the life-history and with the composition and physiological chemistry of koumiss. The average composition was found by analysis to be as follows:—

Casein (true)	. . . . .	2·340	per cent.
Serum albumen	. . . . .	·320	"
Acid albumen	. . . . .	·220	"
Globulin	. . . . .	·100	"
Proteoses (albumose)	. . . . .	·160	"
Acidity (due chiefly to lactic, acetic, succinic acids, etc.)	. . . . .	·576	"
Fat	. . . . .	1·940	"
Sugars (by fermentation)	. . . . .	2·500	"
Alcohol (calculated as C_2H_5OH by weight)	. . . . .	1·060	"
Urea	. . . . .	·017	"
Carbonic acid gas	. . . . .	·611	"
Ash	. . . . .	·210	"

In addition to these, small quantities of leucin, tyrosin, glycocine, pyrocatechin, lecithin, indole, and uric acid were recognised. No peptone could be detected. The uric acid is regarded as probably a decomposition product of proteids. The alcohols were found to comprise ethyl, butyl, and cinnamyl alcohols. In addition to acetic and lactic acids, butyric and propionic acids were detected among the volatile fatty acids.

It will thus be seen that koumiss is a more complex fluid than is generally supposed. The presence of indole and pyrocatechia seems to show that the decomposition which the proteids of koumiss undergo is nearer akin to that brought about by putrefaction of proteids than to any of the other forms of decomposition (by acids, heat, etc.). This the author regards as somewhat strange, in view of the fact that koumiss is such a useful agent in the treatment of diseases more particularly dependent on putrefactive bodies.

Sterilization of Milk. C. W. Earle. (*Chicago Med. Rec.*, iii. 472.) The author agrees with A. R. Leeds and E. P. Davis in objecting to the sterilization of milk at the boiling-point of water, on the ground that such treatment lessens the digestibility and

nutritive value of the milk (compare abstract, *Year-Book of Pharmacy*, 1892, 82). He also concurs in the view that the main object of sterilization may be attained at a temperature of 70°–80° C., without the risk of injury to the milk as food.

Boiled Milk as Infants' Food. H. Drouet. (*Amer. Journ. Pharm.*, September, 1892.) In a report presented to the Paris Academy of Medicine on the use of milk in artificial alimentation of infants, the author arrives at the following conclusions:—

1. While some infants readily digest unboiled milk, the digestibility of milk is not in the least diminished, in the large majority of cases, by boiling.

2. The nutritive power of boiled milk is to a large extent sufficient for the needs of infants.

3. Boiled milk is preserved unaltered for a longer time than unboiled milk.

4. Milk is often the vehicle of contagious disease-germs, and pre-eminently those of tuberculosis.

5. Contagion from that source is prevented by boiling the milk.

6. It is therefore considered most advisable that milk intended for alimentation be boiled.

Digestibility of Raw and Boiled Meat. A. Stutzer. (*Landw. Versuchs-Stat.*, xl. 321–322.) The author's experiments confirm the observation that boiling diminishes the digestibility of meat. The difference in digestibility between boiled and raw meat is found to be most considerable in the presence of a small quantity of hydrochloric acid.

Pupin. A. B. Griffiths. (*Comptes Rendus*, cxv. 320–321.) From the skin of the pupæ of various lepidoptera the author has obtained a colourless, amorphous body, of the formula $C_{14}H_{20}N_2O_6$, which he describes under the name of *pupin*. It is soluble in strong hydrochloric acid and precipitated from this solution by water. On prolonged boiling with strong acids, it splits up into leucine and carbonic anhydride.

Albumoses and Peptone. W. Kühne. (*Zeit. Biol.*, xxix. 1–40; *Journ. Chem. Soc.*, April, 1893, i. 233.) Solutions containing a mixture of albumoses and peptone give a precipitate of albumoses when saturated with ammonium sulphate, the peptone remaining in solution. After filtration, the filtrate, if set aside, will subsequently give a further precipitate if more salt is added. This has been explained by supposing that the saturation was in the first instance incomplete, or that the peptone is partially changed

back into albumose. The present research shows that the former is the more probable explanation. There are many precautions necessary in order to precipitate the last traces of albumose. It is necessary, in the first instance, to use large volumes of the saturated solution in addition to merely adding crystals of the salt to the proteïd mixture. Further, it is found that whereas the greater part of the albumose is precipitated by the salt if the reaction of the mixture is made acid, the residue, which is difficult of precipitation, comes down more readily if the reaction is made alkaline. It is further necessary, after the solution of peptone is obtained, to remove the salt employed; a method for doing this by the use of barium carbonate after concentration is fully described. If pancreatic juice has been used for the preparation of peptone, care also must be taken that leucine and tyrosine are removed also. In drying, concentrating, etc., especially if sulphuric acid is used, a brownish product is formed; this is minimised by care in the manipulations. This substance is precipitable by ammonium sulphate; it is not, however, albumose, and gives no biuret reaction. If a precipitate forms in dialysis, it is not necessarily of proteïd nature; if hard water is used, it may be calcium sulphate.

Nucleïn. H. Malfatti. (*Zeitschr. für physiol. Chem.*, xvii. 8-9.) Further experiments by the author have failed to confirm the opinion previously expressed that nucleïc acid prepared from Liebermann's nucleïn unites with guanine, forming a compound corresponding to the nucleïc acids obtained from natural nucleïn.

Dextrose in Blood. M. Pickardt. (*Zeitschr. für physiol. Chem.*, xvii. 217-219.) After freeing the blood from proteïds and pigment by zinc acetate, it can be readily shown to contain a dextrorotatory constituent fermentable with yeast, reducing Fehling's solution, and proving to be dextrose by its behaviour towards phenylhydrazine.

Absorption of Oxygen by Hæmoglobin. C. Bohr and S. Torup. (*Chem. Centralbl.*, 1892, i. 321 and 486-487.) The proportion of oxygen absorbed by solutions of hæmoglobin is shown by the authors to vary with the concentration of the solution. The dry crystals of oxyhæmoglobin always seem to contain a considerably smaller amount of absorbed oxygen than the solutions from which they are obtained. The authors distinguish several modifications of oxyhæmoglobin, but there appears to be no uniform relation between the quantities of absorbed oxygen, the dry substance, and the proportion of iron of the different modifications.

Occurrence of Strychnine in the Brain in Poisoning Cases. MM. Grandval and Lajoux. (*Répertoire de Pharm.*, July, 1892.) The authors confirm an observation previously made by Gay, Schlagdenhauffen, and Garnier, that in cases of poisoning by strychnine this alkaloid can be detected in the brain.

Elimination of Creasote. Dr. Imbert. (*Bull. gén. de Thérap.*, September, 1892.) The author finds that creasote after its internal administration is almost entirely eliminated with the urine. Only traces of it are found in the expectorations. The elimination through the kidneys is fairly rapid, the greater part of the creasote taken passing away with the urine within twelve hours after its administration.

Elimination of Morphine by the Salivary Glands. J. Rosenthal. (*L'Union Médicale*, March 23rd, 1893.) The author calls attention to the observation that some time after the administration of morphine by hypodermic injections, this alkaloid makes its appearance in unmistakable quantity in the saliva.

The Behaviour of Gallic and Tannic Acids in the Organism. C. F. Mörner. (*Medical Chronicle*, July, 1892.) The author confirms Stockman's observation that, while gallic acid is partly eliminated from the system unchanged, tannic acid is partly excreted in the urine as gallic acid unassociated with any tannic or pyrogallic acid. He has further estimated the amount of gallic acid present in the urine after definite doses of gallic and tannic acids. For this purpose he employed a method similar to that suggested by Wolkow and Baumann for the estimation of homogentisic acid in the urine, which depends on the reducing action of gallic acid on ammoniated silver solution. He finds that the proportion of gallic acid excreted in the urine largely depends on the amount given in one dose. If a drachm to a drachm and a half be taken, 30 per cent. passes in the urine; if 30 grains, only 21 per cent. After 22 grains, only 5 per cent. could be detected; after 7-15 grains, only 2 per cent.; whilst a dose of 3 grains was not followed by the appearance of any gallic acid in the urine. The fæces were found to be quite free from gallic acid, and the conclusion is arrived at that a certain portion of the latter is burnt up in the system in its passage through the body. When tannic acid was taken, only very little gallic acid could be detected in the urine. The administration of even as much as 30 to 60 grains of tannic acid was followed by the appearance of so small a trace of gallic acid in the urine that it could not be estimated. Only when two drachms of tannic acid had been

administered was the quantity of gallic acid sufficient to allow of its quantitative estimation, but only one per cent. of the tannic acid consumed occurred in the urine in the form of gallic acid. No tannic acid was found in the feces, and it is therefore considered probable that the greater part is burnt up in the body. The author suggests as an explanation that the tannic acid forms insoluble or difficultly soluble compounds with albumen, which pass into the intestine and there slowly decompose. The conversion of tannic into gallic acid is so gradual that the small quantities of the latter thus produced are burnt up and therefore never appear in the urine. On the other hand, when gallic acid is taken, a more complete absorption takes place, and therefore a small quantity only is burnt up and the larger portion excreted.

Elimination of Sulphonal. W. J. Smith. (*Zeitschr. physiol. Chem.*, xvii. 1-7.) After the administration of sulphonal, only a small quantity of this substance is eliminated by the urine in an unchanged condition. The greater part undergoes changes in the organism, the chief end product being ethylsulphonic acid.

Localisation of Mercury in the Animal Organism. M. Ullmann. (*Pharm. Post.*, xxv. 1099-1101.) When mercury has become deposited in the organism, the largest amount is found in the kidneys, liver, and spleen, in the order given. The stomach contains very small but weighable quantities, while rather more is found in the intestines. Small weighable quantities are found in the heart and skeletal muscles, and occasionally also in the lungs. The brain, salivary glands, abdominal gland, thyroid gland, bile, and bone substance may contain unweighable traces, or none at all.

Cancroin. Dr. Adamkiewicz. (*Pharm. Zeitung*, 1892, 755; *Amer. Journ. Pharm.*, February, 1893.) Cancroin has been obtained by the author from cancer tissue, upon which *Coccidium sarkolytus* is parasitic. It is a functional product, and as such presents protection against the parasite itself. It has a remarkable similarity, physically and physiologically, to the ptomaines, especially to *neurine*, and the latter could replace cancroin in its specific action towards the cancer-cell; it is possible that the two substances are identical. The name *cancroin* is not exclusively applied to the poison in the cancerous tissue, but also to a solution containing 25 per cent. of *neurine* neutralized with citric acid, then saturated with carbolic acid, and, lastly, diluted with twice its volume of water.

Cobra Poison. A. A. Kanthack. (*Journ. Physiol.*, xiii. 272-

299; also *Lancet*, 3589, p. 1296.) The venom of the cobra is an albumose closely resembling in its properties proto-albumose. It does not contain any globulin, and is free from alkaloids. Its poisonous effects are more or less rapidly destroyed by chlorine water, caustic alkalies, iodine trichloride, potassium permanganate, phenol, gold chloride, silver nitrate, mercuric chloride, and alcohol. Experiments to establish immunity against the poison proved entirely unsuccessful. The author is unable, on the strength of repeated experiments, to share the favourable view entertained by A. Calmette (*Journ. de Pharm. et de Chim.*, xxv. 539) respecting the curative effects of hypodermic injections of gold chloride. Strychnine, which has also been recently recommended as a remedy, is neither a chemical nor a physiological antidote.

Bacterial Poisons. W. Simon. (*Pharm. Journ.*, 3rd series, xxiii. 7-9, 25-26, and 43-47. From *Pharm. Review*.) In this essay the author gives a review of the work done in the chemical examination of products resulting from bacteria. The subject is divided into three sections, viz. :—

- I. Historical sketch.
- II. Ptomaines.
- III. Ptomaines in food.

As a report of this description cannot be adequately dealt with in the form of an abstract, the reader is referred to the source above mentioned.

Chemical Reactions of Tuberculous Pus. M. Debraye and E. Legrain. (*American Druggist*, March, 1893. From *Journ. de Pharm. et de Chim.*) Several drops of the pus are diluted with 2 or 3 c.c. of distilled water, and mixed with a small fragment of KHO or NaHO; to this mixture are added a few drops of an uncoloured solution of sulphate of copper. If the pus is warm a rose colour is obtained, and a violet coloration with the tuberculous pus only if it contains the tubercular bacillus and has never been contaminated by the pyogenic microbes. The cause of this phenomenon is at present obscure.

A New Ptomaine. A. B. Griffiths. (*Comptes Rendus*, cxv. 418.) The ptomaine reported upon in this paper is a toxic base crystallizing in prismatic needles having the composition $C_5H_6N O_3$. It is formed when *Micrococcus tetragenus*, an organism found in the sputum of consumptives, is cultivated on peptonized gelatin, and

is evidently a decomposition product of the proteïd matter of the latter, formed by the agency of this microbe.

Ptomaines of Infectious Diseases. A. B. Griffiths. (*Comptes Rendus*, cxiv. 1382-1384. From *Journ. Chem. Soc.*) The author has continued his researches on this subject, and has isolated two ptomaines from the urine of victims to glanders and pneumonia. Neither of these bodies occur in normal urine. The one extracted from urine in cases of glanders forms white crystals of the composition $C_{15}H_{10}N_2O_6$. The hydrochloride, platinochloride, and aurochloride are all crystalline. Its solutions give a greenish precipitate with phosphotungstic acid, a brownish white precipitate with phosphomolybdic acid, a yellow precipitate with picric acid, and a precipitate with Nessler's solution. The base is poisonous, and when injected under the skin of a rabbit, produces abscesses at the point of injection, peculiar nodular lesions in the lungs, etc., and finally, death.

The ptomaine from the urine of pneumonia patients forms white, microscopic needles, soluble in water, forming an alkaline solution. It forms a hydrochloride, platinochloride, and aurochloride, and its solutions give a white precipitate with phosphotungstic acid, a yellowish-white precipitate with phosphomolybdic acid, a yellow precipitate with picric acid, and a brownish precipitate with Nessler's solution. The base has the composition $C_{20}H_{26}N_2O_3$, and its specific rotatory power is $[\alpha]_D = +23.5^\circ$.

Ptomaines from the Urine in Erysipelas and Puerperal Fever. A. B. Griffiths. (*Comptes Rendus*, cxv. 667-669.) The author has isolated from the urine of patients suffering from erysipelas a highly poisonous ptomaine of the composition $C_{11}H_{13}NO_3$. Another very toxic ptomaine has been obtained by him from the urine of persons affected with puerperal fever. Neither of these bodies occur in healthy urine.

A Ptomaine from the Urine of Patients suffering from Eczema. A. B. Griffiths. (*Comptes Rendus*, cxvi. 1205.) The author has isolated from the urine of patients suffering from eczema a white crystalline toxic alkaloid of the formula $C_7H_{15}NO$, for which he suggests the name "eczemine." This ptomaine does not occur in normal urine.

A New Leucomaine. A. B. Griffiths. (*Comptes Rendus*, cxv. 185-186.) The body described by the author was obtained from the urine of an epileptic patient by rendering the urine alkaline with sodium carbonate, shaking with half its volume of ether, then agitating the filtered ethereal extract with an aqueous solu-

tion of tartaric acid, precipitating the alkaloid from the acid liquid with sodium carbonate, and purifying it by recrystallization from ether. It is a white substance crystallizing in prisms, which are soluble in water with a faintly alkaline reaction, and have a composition corresponding to the formula $C_{12}H_{16}N_5O_7$. It forms a crystalline hydrochlorate and aurochloride, yields a greenish-white precipitate with mercuric chloride, a yellowish one with silver nitrate, a white one with phosphotungstic acid, a brownish-white one with phosphomolybdic acid, and a yellow one with tannic acid. It is poisonous, producing trembling, intestinal and urinary evacuations, dilatation of the pupils, convulsions, and death.

The Value of Ehrlich's Urine Test for Typhoid Fever. G. M. Beringer. (*Amer. Journ. Pharm.*, November, 1892.) The colour produced by urine with a solution of sulphanilic acid has been claimed by Ehrlich as a means of detecting typhoid in its earlier stages, even before the appearance of the typical symptoms. A small quantity of a 1 per cent. solution of sodium nitrite is added to the urine, and then a quantity of a saturated solution of sulphanilic acid in a 5 per cent. solution of hydrochloric acid, followed by the addition of ammonia. The test is stated to produce a deep red colour.

The author has critically examined this and other modes of applying the test, and arrives at the conclusion that the claims put forth for it cannot be admitted. While the failure of the reaction may indicate the absence of typhoid, the occurrence of the reaction would not warrant the diagnosis of typhoid unless supported by other evidence, as many of the products producing the reaction, notably phenol and peptone, may be present in the urine from other causes.

Catechol in the Urine of Hydrophobic Rabbits. R. Moscatelli. (*Virchow's Archiv*, cxxviii. 181.) The author reports that a notable proportion of catechol can be invariably detected in the urine of rabbits during the hydrophobic state induced by injections of Pasteur's material.

A Crystalline Globulin occurring in Human Urine. D. Noël Paton. (*Proc. Roy. Soc. Edin.*, xix. 102-115. From *Journ. Chem. Soc.*) In the urine of a patient recovering from a prolonged attack of diarrhoea, the percentage of proteïds was found to be very high—2·00 per cent., of which 1·92 consisted of globulin. On another occasion, the total proteïds were 3·82, of which globulin was 3·732. It was obtained by precipitation with ammonium

sulphate, filtering, washing, and dialysing; the crystals were elongated and rhombic, and larger than those of tyrosine, but, instead of being a circular, they were terminated by a characteristic angular extremity—coagulation occurs below 60° and above 56°—dried at 110°, they were found to consist of C 51.89 per cent., H 6.88, N 16.06, S 1.24, O 23.93.

Hæmatoporphyrin in Urine. M. Sobernheim. (*Deutsch. med. Wochenschr.*, July, 1892.) The author detected this body in the urine of a boy suffering from enteric fever. No sulphonal had been administered in this case.

Hæmatoporphyrin in Urine. O. Hammarsten. (*Zeitschr. für analyt. Chem.*, xxxi. 233–235. From *Journ. Chem. Soc.*) Owing to the increased use of sulphonal, cases of hæmatoporphyrinuria seem to become more frequent. The following is the method employed by the author for examining urine in which the colour and spectroscopic characters indicated the presence of hæmatoporphyrin. The urine was first precipitated with barium acetate, and the filtrate from this precipitate treated with barium acetate and sodium carbonate alternately, until a filtered sample gave a white precipitate with these reagents. The precipitates were washed and extracted with acidified alcohol. The acid extract was shaken with an equal volume of chloroform and several times its bulk of water, when most of the colouring matter passed into the chloroform. This was rapidly withdrawn from the weak alcohol, washed well with water, and evaporated in shallow basins in the dark. The brown residue was soluble in chloroform with splendid purple colour, and could be crystallized from warm alcohol in needles resembling Nencki and Sieber's hæmatoporphyrin hydrochloride. It was insoluble in cold water and in highly dilute acids, sparingly soluble in cold alcohol; in these respects, and in the situation of the absorption bands, which were slightly nearer to the red end of the spectrum, differing from Nencki and Sieber's product. In only one case out of the four met with did the substance obtained appear to be identical with that of Nencki and Sieber; in another case the chromogen of a similar colouring matter was observed. Of the four absorption bands in the spectrum of a solution of hæmatoporphyrin in ammonia and zinc chloride, those between C and D, and between b and F, disappear within 24 hours, the former first. The other two bands are permanent.

Hæmatoporphyrin in Urine. A. E. Garrod. (*Journ. Pathol. and Bacteriol.*, i. 187–197.) The author finds that traces of this

substance occur normally in healthy urine, and are increased in many diseases.

Cystin and Cystein. K. Brenzinger. (*Zeitschr. für physiol. Chem.*, xvi. 552–558. From *Journ. Chem. Soc.*) Cystein reacts with mercuric chloride, forming the compound $C_3H_{14}N_2S_2O_4Hg_2Cl_6$. This salt, when treated with ethyl iodide, yields *ethylcystein*, $C_3H_6NO_3 \cdot S Et$, which forms nacreous plates and melts at $226-228^\circ$. Like phenylcystein, ethylcystein, when boiled with sodium hydrate and Fehling's solution, is decomposed into mercaptan and ammonia. It is, however, more slowly decomposed than phenylcystein. By the use of alkalies, and also by nitrous acid, pyruvic acid is not obtained from ethylcystein, as this acid is so easily further changed.

Cystin forms a benzoyl derivative which is decomposed by hydrochloric acid into benzoic acid and cystin. With isocyanic acid, cystin forms an uramido-acid, which with the loss of water easily passes into the corresponding hydantoin.

A number of unsuccessful efforts to form cystin synthetically were made.

Reducing Agents in Normal Human Urine. G. S. Johnson. (*Chem. News*, lxvi. 91.) In correcting a misquotation in Neubauer and Vogel's *Analyse des Harns*, p. 57, the author points out that, when removing reducing substances from urine by means of mercuric chloride, he disposes of the excess of mercury by adding ammonia solution cautiously until precipitation is complete; under these circumstances, both the solution, and the precipitate when decomposed by hydrogen sulphide under water, are free from substances reducing copper oxide. He recognises that when hydrogen sulphide is used to remove the excess of mercury, a decidedly reducing solution is produced.

A New Sugar in Urine. E. Salkowski and M. Jastrowitz. (*Zeitschr. für analyt. Chem.*, xxxi. Part 6.) The authors state that persons addicted to the morphine habit eliminate with the urine a sugar producing a yellow precipitate with alkaline copper solutions, but giving negative results with the polarization and fermentation tests.

Disturbing Influence of Glycosuric Acid on the Titration of Sugar in Urine. A. Geyger. (*Pharm. Zeitung*, 1892, 1488.) The author calls attention to the observation that the presence of glycosuric acid in diabetic urine gives rise to great variations in the amount of sugar indicated by Fehling's solution, according to the degree of dilution of the urine. Whenever such anomalies

are observed in the titration, the urine under examination should therefore be tested for glycosuric acid by acidifying with dilute sulphuric acid, shaking with ether, etc.

Detection of Small Quantities of Sugar in Urine. J. Seegen. (*Pharm. Centralhalle*, xxiii. 730.) The urine is repeatedly filtered through blood charcoal until it passes through quite colourless. The charcoal is then washed with water, the first washing rejected, and the second and third washings collected and tested with Fehling's solution, with which they will react like a pure solution of glucose, if the urine under examination contained sugar. Two or three filtrations are sufficient to effect decolorization, but in the presence of bile constituents the filtered urine remains coloured; but in this case the test is nevertheless proceeded with just as if decolorization had been effected. Urines containing much urates must be strongly acidified with hydrochloric acid, put aside for 24 hours, neutralized, and then treated as above.

Pancreatic Diabetes. V. Harley. (*Brit. Med. Journ.*, 1892, ii. 451-454.) The author accepts Lépine's view that the sugar in the urine of patients suffering from this form of diabetes is due to the absence of a glycolytic ferment in the circulation (see *Year-Book of Pharmacy*, 1891, 111).

Detection of Albumen in Urine. E. Gérard. (*Journ. de Pharm. et de Chim.*, August, 1892, 104.) The author points out that under the influence of milk diet, patients suffering from Bright's disease may pass urine comparatively free from albumen and containing propeptone in its place. Such urine may fail to show any coagulation on heating, and may produce with nitric acid a precipitate soluble in excess. The presence of propeptone in such cases may be verified by the formation of a flaky precipitate on mixing the urine with a saturated solution of sodium chloride, the precipitation being promoted by the subsequent addition of acetic acid. The author considers it advisable, therefore, not to rely merely on the test for coagulable albumen in cases of suspected albuminuria, but also to test for propeptone. The latter may be quantitatively estimated by slightly acidifying the urine with acetic acid, and adding an excess of sodium chloride, which is followed after twenty-four hours by an addition of ammonium sulphate. The precipitate is now collected, washed with a weak solution of sodium chloride and ammonium sulphate, then dissolved in water with the aid of acetic acid, and reprecipitated by alcohol. It is now once more collected, washed with alcohol, dried and weighed.

Detection of Albumen and Bile Pigments in Urine by Means of

Chromic Acid. O. Rosenbach. (*Chem. Centralbl.*, 1892, 557.) The author uses a 5 per cent. solution of chromic acid as a reagent for both albumen and bile pigments. In the presence of albumen, the addition of a few drops of this solution to the slightly acidified urine causes the formation of a flocculent precipitate. In order to test for bile pigments, the reagent should be added in successive small quantities of one single drop at a time, shaking well after each addition. The presence of bile pigments is thus indicated by the production of a deep green coloration. If too much of the reagent be used, this change may be overlooked, as a brownish-red coloration is formed.

Estimation of Uric Acid in Urine by the Haycraft-Herrmann Method. E. Deroide. (*Bull. Soc. Chim.* [3], vii. 363-364.) The precipitation of the uric acid as silver urate is always accompanied by the simultaneous precipitation of silver compounds of the xanthine group insoluble in ammonia. This is found by the author to be the reason why the results of this method are invariably too high.

Precipitation of Uric Acid as Ammonio-Magnesium Urate. O. Guérin and H. Thorion. (*Journ. de Pharm. et de Chim.*, xxvi. 202.) The results obtained in the estimation of phosphoric acid in urine are too high, owing to the simultaneous precipitation of ammonio-magnesium urate, $(C_5H_2N_4O_3H)_{10}(NH_4)_8Mg + 45H_2O$, which causes the pyrophosphate obtained after ignition to contain a corresponding excess of magnesia. If the ignited precipitate be redissolved in hydrochloric acid and again precipitated as ammonio-magnesium phosphate, this source of error in the estimation of phosphoric acid in urine is eliminated.

Estimation of Uric Acid. H. C. Geelmuyden. (*Zeitschr. für analyt. Chem.*, xxxi. 158-180. From *Journ. Chem. Soc.*) An accurate process for estimating uric acid in urine is still a desideratum. Salkowski's method of precipitation with ammoniacal silver and magnesium solution is open to the objection that other nitrogenous substances, especially xanthine and its congeners, are precipitated with the uric acid. The necessity for applying a correction for the solubility of uric acid in the final wash water is a further objection. Ludwig's modification is no improvement, and introduces fresh sources of error. The author has sought to employ the precipitation of uric acid by barium chloride as a means of estimation, and has obtained promising results, but is obliged to discontinue the investigation without bringing the method to perfection. Instead of weighing the precipitate, it is

preferable to determine the nitrogen in it by Kjeldahl's method. From a solution of sodium hydrogen urate, the uric acid can be almost absolutely precipitated by adding barium chloride, heating for half an hour on the water-bath, allowing the mixture to remain until next day, and filtering off. Solutions containing as little as 9 milligrams in 100 c.c. give very satisfactory results. The presence of ammonium chloride or of disodium hydrogen phosphate, or of the two together, is without influence; but free acid or free alkali, and the latter especially in presence of phosphates, prevents complete precipitation. The acidity of normal urine has a similar effect, so that neutralization is requisite; but this, in the presence of phosphates, presents peculiar difficulties. If, however, the addition of alkali is stopped, either when precipitation of earthy phosphates commences, or when litmus paper wetted with the liquid just remains blue after drying, precipitation of the uric acid seems to be complete, but other nitrogenous substances appear to be thrown down, since the results calculated from the nitrogen found come out higher than by Salkowski's method. The excess is the greater, the richer the urine is in uric acid, and in one case amounted to 70 per cent. On the other hand, the uric acid obtainable from the barium precipitate (in a case where the barium method showed 0.0059 gram, or 13 per cent. more than Salkowski's) was 0.00365 gram, or 8 per cent. less than Salkowski's; neither could it be ascertained that more than a trace was lost. Dilution of the urine leads to lower, but apparently untrustworthy results, since a degree of dilution which would not interfere with a satisfactory estimation if using a pure urate, yet when applied to urine, reduces the amount of nitrogenous substance precipitated to a small fraction of that shown by Salkowski's method. The subject needs and seems to deserve further investigation.

Estimation of Creatinine in Urine. J. Moitessier. (*Bull. de la Soc. Chim.* [3], vi. 907-908.) The author adversely criticises the process of Gautrelet and Vieillard and that of Hoppe-Seyler for the estimation of creatinine in urine, and contends that the only method affording accurate and concordant results is that of Neubauer.

A Colour Reaction of Saliva. C. Rosenthal. (*Bull. de Pharm. de Bruxelles*, xxxvi. 236. From *Pharm. Journ.*) On the addition of a few drops of nitric acid, saliva is stated to coagulate slightly, and to assume a golden yellow tint, with a rapidity proportional to the degree of heat. The reaction resembles that produced with

xanthoprotein. A precipitate is slowly deposited for some time. This is turned brown by alkalis, and bright orange by an excess of the same. If the saliva be obtained from individuals affected with kidney disease or cancer of the stomach, the coloration produced is stated to be first red, then violet; and a similar result is affirmed to occur in the case of healthy persons whose salivary glands are excited by tobacco, pilocarpine, etc.

Detection of Carbon Bisulphide in the Blood in Cases of Poisoning. A. Westberg. (*Zeitschr. für analyt. Chem.*, xxxi. 484-486.) About 15 c.c. of the fresh-drawn blood are mixed with half its volume of water, and distilled under reduced pressure in a stream of carbonic anhydride or hydrogen. The carbon bisulphide can be detected in the distillate by treatment with an ethereal solution of triethylphosphine, which is the most delicate reagent for this substance. Another very sensitive test consists in the conversion of the bisulphide (contained in the distillate) into potassium xanthate, evaporation to dryness in the vacuum, and testing the residue with sulphuric acid and ammonium molybdate, whereby a red coloration is produced. The sulphocyanide reaction is much less delicate.

Detection of Mercury in the Organism. E. Ludwig. (*Chem. Centralbl.*, 1892, 941.) The finely divided organs are extracted for some hours with hot 20 per cent. hydrochloric acid, to which, after cooling, small successive portions of potassium chlorate are added; the clear filtered liquid is repeatedly agitated with zinc dust, the latter allowed to settle, then washed first with water, and subsequently with water containing a trace of alkali, then again with water, and finally with alcohol. It is dried on a glass wool filter by suction in a current of air, and the mercury then volatilized from it by heat, and recognised in the usual manner.

Estimation of Hydrochloric Acid in the Contents of the Stomach. G. Langermann. (*Virchow's Archiv*, cxxviii. 408-412.) The method recommended by the author is that of Hayen and Winter, and is worked as follows:—Into each of three vessels, 5 c.c. of the material to be tested are placed; excess of concentrated solution of sodium carbonate is added to the first, and all three are evaporated on the water-bath; the second is heated an hour longer to drive off all free hydrochloric acid; sodium carbonate is then added, and it is once more concentrated; the third is dried, and then incinerated, and thus all combined (*i.e.*, with proteid), chlorine is given off. All three are raised for a few minutes to a red heat when dry.

The residues are taken up with distilled water, a little nitric acid is added, and the mixture boiled to drive off carbonic anhydride. The chlorine is estimated in each in the usual way by silver nitrate; the first gives the total chlorine; the second gives the fixed and combined chlorine; the third gives the fixed chlorine only. The difference between the first and second gives the value of the free hydrochloric acid. The difference between the second and third gives the value of the combined hydrochloric acid.

Volumetric Estimation of Peptones. M. Roux. (*Journ. de Pharm. et de Chim.* [5], xxv. 544-545.) The peptone solution is freed from albumen and any reducing substances present, and is then titrated with Fehling's solution. The colour of the solution changes through light blue, violet, lilac, to purple, and ultimately to grey. The purple tint is taken as the end of the titration. 1 c.c. of Fehling's solution thus indicates 0.004 gram of peptone.

Estimation of Peptone. M. Hallopeau. (*Pharm. Journ.*, from *Comptes Rendus*, cxv. 356.) The author suggests the use of mercuric nitrate for determining the amount of peptone as being preferable to other methods. By that reagent a white, flocculent, and voluminous precipitate of mercuric peptonate is obtained, which separates rapidly and may be washed on a weighed filter until the filtrate no longer gives a reaction with sulphuretted hydrogen. The weight of the dry precipitate, multiplied by the coefficient 0.666, gives the quantity of peptone. The liquid from which peptone has been fully precipitated by mercuric nitrate should not give a precipitate with phosphomolybdic acid. It is necessary that the mercuric nitrate used should be free from the excess of nitric acid which is commonly present in the salt, and would partially re-dissolve the mercuric peptonate. The salt should therefore be heated on the water-bath with ten times its weight of water for twenty minutes, the filtered solution brought nearly to the boiling-point, and a few drops of sodic carbonate added until the precipitated oxide no longer re-dissolves. The solution is then filtered and diluted, so that a litre contains about one hundred grams of the salt. It is stated that the presence of chlorides, in the proportion they exist in commercial peptones, or in the gastric juice, does not interfere with the determination of peptone by this method, provided a sufficiently large excess of the mercuric nitrate is used. The partial and imperfect precipitation of peptone by the mercuric chloride, formed by the mutual decomposition of sodic chloride and mercuric nitrate, necessitates the addition of a quantity of mercuric

nitrate sufficient to ensure the presence of an excess of this salt. It is also necessary that the liquid in which peptone is to be determined should be free from other albuminoids. When that is not the case, these substances must be eliminated before the precipitation with mercuric nitrate. For that purpose the liquid probably containing free hydrochloric acid is exactly neutralized with sodic carbonate. The syntonin thus separated is collected by filtration, and the filtrate slightly acidified with acetic acid is heated on a water-bath for half an hour. After separating the coagulated albumen, nitric acid is carefully added to the filtrate until it becomes turbid. The liquid is then shaken, the deposit of hemialbumose allowed to settle, and separated by filtration. The filtered liquid, thus deprived of albumen, syntonin, and hemialbumose, is to be neutralized almost completely with sodic carbonate and mixed with about its own volume of mercuric nitrate solution to throw down the precipitate of mercuric peptonate.

Action of Fehling's Solution on Phenylhydrazine. H. Strache and M. Kitt. (*Monatshefte*, xiii. 316-319.) Hot Fehling's solution oxidizes phenylhydrazine with the formation of benzol and phenol and liberation of the whole of the nitrogen. The authors find that, for every molecule of phenylhydrazine operated upon, 3 molecules of cupric oxide are reduced to the cuprous state, the end of the reaction being indicated by the complete decolorization of the reagent. With cold Fehling's solution the oxidation is much less complete, aniline being among the products formed.

Colorimetric Estimation of Salicylic Acid in Presence of Phenols. A. Fagans. (*Chem. Zeitung*, 1893, 69.) The author's method is based on the observation that, in alcoholic solution, salicylic acid reacts with ferric chloride, forming the well-known coloration, while phenols do not. Full details are given in the paper.

Quantitative Separation of Salicylic and Benzoic Acids. Miss J. Schaap. (*Pharm. Journ.*, 3rd series, xxiii. 84. From *Ned. Tyd. Pharm.*) The mixture of acids is dissolved in a sufficiency of hot water; the liquid allowed to cool, and the salicylic acid precipitated by excess of bromine water. The precipitate is a di-bromo compound, and contains the whole of the salicylic acid. The benzoic acid may be directly estimated by rendering the filtrates faintly alkaline with sodium carbonate, and evaporating to a small bulk on a water-bath, to expel excess of bromine. The residues being placed in separatory funnels, and acidified with hydrochloric acid, are shaken out with chloroform, which is then filtered through

a dry filter and allowed to evaporate spontaneously in weighed glass dishes.

The results are stated to be satisfactory.

Estimation of Tannic and Gallic Acids. W. P. Dreaper. (*Abstract of a Paper read before the Society of Chemical Industry, May 31st, 1893.*) A quantity of the solution to be tested equivalent to about 0.5 gram of tannin is heated to 90° C. with the addition of 1 gram of barium carbonate, the mixture then removed from the source of heat, and immediately titrated with a solution of copper sulphate containing 30 grams of the crystallized salt in 1 litre. The titration is complete as soon as a drop of the filtered mixture turns pink on the addition of a drop of a weak solution of potassium ferrocyanide. At the end of the experiment the temperature of the mixture should not be less than 30° C. 0.5 gram of pure tannic acid will thus require 25 c.c. of the copper solution for complete precipitation; but allowance should be made for the error due to the indicator in c.c. of standard solution added to different quantities of water, as shown in the following table:—

c.c. of water.	c.c. of standard solution required.
20	0.8
30	0.4
60	0.7
100	1.0
150	1.5

Gallic acid, if present, is likewise precipitated in this test; 0.5 gram of the purest commercial acid requires 45 c.c. of the copper solution. In order to determine the tannic acid in the presence of gallic acid, the titration is first carried out with 25 c.c. of the solution in the manner above described. After this another 50 c.c. of the solution are mixed with 28.6 c.c. of solution of gelatine (containing 20 grams per litre); the mixture is now saturated with dry common salt, then acidified with 10 c.c. of normal solution of sulphuric acid, and agitated with 5 grams of barium sulphate. The mixture, which now measures 100 c.c., is filtered, and 50 c.c. of the filtrate (equivalent to 25 c.c. of the original solution) heated to 90° with 1 gram of barium carbonate, and titrated as before. The difference between the two titrations represents the number of c.c. required for the complete precipitation of the tannic acid.

Proportion of Lead in Commercial Tartaric and Citric Acids. M. Buchet. (*Pharm. Zeitung*, 1892, 660.) The author has tested

a number of commercial samples of these acids, and found the average amount of combined lead in fourteen of these to be 0.0363 per cent. Besides this they contained an average proportion of 0.0071 of lead in the metallic state.

A New Test for Acetone. A. Schwicker. (*Chem. Zeitung*, xv. 914.) The solution to be tested is mixed with a few drops of ammonia and a few drops of decinormal solution of iodine. The small quantity of iodide of nitrogen thus formed disappears on shaking and warming; if it does not, it can be removed by the careful addition of a few drops of an exceedingly weak solution of sodium hyposulphite. If acetone was present, iodoform will be produced shortly after the disappearance of the iodide of nitrogen, and a characteristic pungent odour will become perceptible, and may be rendered more distinct by the addition of a little more iodine solution. The odour is not appreciably masked by the ammonia. The liquid to be tested must be free from aldehyde. The presence of alcohol does not interfere with the reaction.

Determination of Higher Alcohols in Spirits of Wine. C. Bardy. (*Comptes Rendus*, cxix. 1201-1204; *Pharm. Journ.*, 3rd series, xxiii. 261.) A preliminary examination is made by agitating 10 c.c. of the alcohol to be tested with 50 c.c. of saturated solution of sodium chloride. Two results may thus be produced.

(1) The salt solution forms a clear mixture with the alcohol, thus indicating that the amount of impurity is small. In this case 500 c.c. of the alcohol are mixed in a capacious separator with 450 c.c. of solution of sodium chloride, and subsequently with sufficient water to re-dissolve the salt separated. 60 to 70 c.c. of carbon bisulphide are then added, the whole is well shaken, and after some minutes' rest the bisulphide is separated. This operation is repeated three times. The bisulphide will then contain the whole of the butyl and amyl alcohols, and to extract these it is shaken with 2 c.c. of strong sulphuric acid, and the acid removed, after settling, into a flask of 125 c.c. capacity. This operation is also repeated several times, and the united acid liquor is freed from bisulphide by warming. An equal volume of glacial acetic acid is now added, the neck of the flask closed with a reflux condenser, and the mixture heated to 100° C. for four hours to promote formation of acetic ethers. The contents of the flask are then mixed with 100 c.c. of salt solution; if higher alcohols were present, the ethers will separate as an oily layer on the surface. This oily liquid is separated and

measured at 15° C.; the volume expressed in c.c., and multiplied by 0.8, gives the percentage of butyl and amyl alcohols.

(2) An oily layer separates at the surface of the salt solution in the preliminary experiment. In that case larger amounts of the higher alcohols are present, and the operations above described are now carried out with a smaller quantity (25 c.c.) of the alcohol, 100 c.c. of saturated salt solution, and 8 to 10 c.c. of water. The quantity of bisulphide of carbon should not be reduced. Since the latter dissolves only the butyl and amyl alcohols, the liquid from which the bisulphide has been separated must be examined for propyl and isopropyl alcohols. For this purpose it is filtered through moist paper and distilled, the distillate being collected in a tube containing an alcoholometer until this instrument indicates 50°. At that point the whole of the propyl alcohol will have passed over, and may be determined in the distillate by titration with permanganate.

Test for Cocaïne. A. Kuborne. (*Pharm. Centralhalle*, 1892, 411 and 432.) 1 c.c. of strong nitric acid is added to a small quantity of the alkaloid, and evaporated to dryness on a water-bath; the cold residue is mixed with one drop of an amyl alcohol solution of potassium hydrate, and the mixture again heated on the water-bath, when the presence of cocaïne will be indicated by the production of a deep violet coloration. A similar coloration is obtained under the same conditions with atropine, with this difference, however, that the atropine reaction is produced in the cold and is destroyed by subsequent heating on the water-bath.

The Bichromate Test for Strychnine. H. Beckurts. (*Archiv der Pharm.*, 1893.) This test is rendered much less delicate in the presence of a large proportion of brucine. If the strychnine be associated with 40 times its weight of brucine, the reaction is not only much less distinct, but requires a much larger quantity of strychnine than otherwise in order to be recognisable.

Detection of Atropine in Poisoning Cases. L. Fabris. (*Gazz. Chim. Ital.*, xxii. 347-350.) The author calls attention to the observation that the chemical detection of atropine in cases of poisoning is rendered much more difficult by the simultaneous presence of strychnine, which seems to obscure the reactions of the former base. But though the chemical tests may fail in such cases, the recognition of atropine by means of its physiological action is not interfered with.

Estimation of Theïne in Tea. N. V. Sokoloff. (*Journ. Russ. Chem. Soc.*, xxiv. 130.) The dried tea is moistened with 15 to

20 drops of alcoholic ammonia and extracted with chloroform. The solution is evaporated, the residue mixed with magnesia, and extracted with three successive quantities of boiling water, the filtered aqueous solutions are evaporated to dryness, and the resulting theine purified by dissolving in water and extracting with chloroform.

Estimation of Theobromine in Cacao-Beans. P. Süss. (*Apotheker Zeitung*, 1893, 78.) The crushed beans are intimately mixed with an equal weight of purified sand, and 6 grams of the mixture thoroughly extracted with petroleum ether to remove all the fat. The residue is boiled for half an hour with 200 c.c. of distilled water and 6 grams of freshly prepared pure lead hydrate, strained, expressed and filtered; the insoluble portion is twice boiled with 100 c.c. of distilled water, and the united filtrates are evaporated to 10 c.c., then transferred to a separating funnel and agitated for three minutes with 100 c.c. of chloroform. After complete separation the chloroform is removed and the same treatment repeated three times. From the united chloroform solutions, the greater portion of the solvent is removed by distillation, the residual liquor transferred to a tared beaker, the flask rinsed with warm chloroform, and the contents of the beaker and rinsings evaporated to dryness on a water-bath. The alkaloid is thus obtained in the form of a white crystalline powder practically free from impurities.

Detection of Coal-Tar Colours in Wines. A. Trillat. (*Comptes Rendus*, cxiv. 1278.) The reagent used by the author is formic aldehyde, which precipitates the extractive and natural colouring-matters of wine, without affecting any coal-tar colours that may be present.

Detection of Cherry-Juice in Raspberry-Juice. M. Wimmer. (*Chem. News*, February 24th, 1893. From *Pharm. Zeitung*.) The juice is mixed with an excess of solution of basic acetate of lead, and the mixture filtered. Pure raspberry-juice thus yields a nearly colourless filtrate, while in the presence of cherry-juice the filtrate is blue or bluish-red.

Butter Testing. B. Fischer. (*Pharm. Zeit.*, 1892, 439. From *Pharm. Journ.*) For the purpose of a preliminary examination the author recommends that the specific gravity of the butter fat at 100° C. should be taken as one of the most trustworthy tests, together with the determination of the saponification number by Kottstorfer's method. According to the determinations made by Sell, the specific gravity of butter fat at 100° C. varies between

0·867 and 0·868, while the specific gravities of the other kinds of fat which have to be taken into account are as follows:—

Artificial butter	0·861
Ox fat	0·859
Lard	0·860

The low specific gravity of a sample is therefore ground for suspicion, and any sample having a specific gravity of 0·865, or less than that, will require to be further tested.

For determining the saponification number, one or two grams of the clear filtered butter fat should be heated with 25 c.c. of a half-normal alcoholic solution of potash in a flask, to the neck of which a long tube is attached to serve as a reflux condenser. Heat is to be applied in a boiling water-bath and kept up for half an hour. Phenolphthalein is added after the liquid has cooled, and the quantity of uncombined alkali ascertained by titration. The number of milligrams of KHO required for the saponification of 1 gram of normal butter fat, or the Kottstorfer number, is from 227 to 240. For all other kinds of animal fat and for margarine this number is 195. If, therefore, in testing a particular sample, the determination of the Kottstorfer number gives a value of from 227 to 230, it may be considered free from suspicion. In cases of the admixture of foreign fat, the value found is generally 210, and less than that. But even when a normal number is obtained, it must be remembered that the saponification number of cocoa-nut fat is 260. Generally speaking, however, when the specific gravity of a sample is not less than 0·866, and the Kottstorfer number is not less than 227, it may be inferred that the sample is free from any other suspicion than that of the presence of cocoa-nut fat.

Of the more exact methods of testing, the author gives preference to that of Hehner and Angell, and that of Reichert and Meissl, as modified by Wollny, the former measuring the amount of fat acid insoluble in water and the latter the amount of volatile fat acid. In carrying out the first-named test, a mixture of from 3 to 4 grams of clear filtered fat with 2 grams of caustic potash and 50 c.c. of alcohol is to be heated on a water-bath until the fat is completely saponified. The alcohol is then evaporated off, the soap dissolved in 150 c.c. of hot water, and decomposed by dilute sulphuric acid. The liquid, with the melted fat acids floating on its surface, is then transferred to a previously weighed filter half filled with hot water, and washed with hot water until the filtrate has no acid reaction. The fat acid in the filter is then

solidified by dipping the funnel into cold water and transferred with the filter to a glass capsule of known weight, the whole dried at 100°C . and weighed. The Hehner number thus obtained is for normal butter at the utmost 88, while for other kinds of fat it is from 95 to 97.

For the Reichert test a mixture of 5 grams of clear filtered fat, 2 c.c. of 50 per cent. caustic soda solution, free from carbonate, and 10 c.c. of 96 per cent. alcohol is heated for a quarter of an hour upon a boiling water-bath in a flask of 300 c.c. capacity, and having a reflux condenser attached to its neck. The alcohol is then distilled off from the flask, the soap residue mixed with 100 c.c. of freshly boiled distilled water, and the whole kept hot for a quarter of an hour. After cooling the soap solution to 50°C ., it is mixed with 40 c.c. of dilute sulphuric acid (25 c.c. H_2SO_4 to 1 litre), some fragments of pumice stone dropped in, and distilled until the quantity collected amounts to 110 c.c. This distillate is passed through a dry filter, and 100 c.c. of it mixed with phenolphthaleïn, titrated with decinormal baryta solution. The number of cubic centimetres required for neutralizing the volatile fat acid in the distillate is the Reichert Meissl Wollny number. For normal butter fat it varies from 24 to 28. Samples giving the lower figure may be regarded as free from suspicion, but results below 24 point to probable adulteration, as almost all other kinds of animal fat give lower numbers, margarine 0.5 to 1.0, and coconut fat gives 3.00.

The author considers that it is a safe plan to apply this last described test in the first instance, and that all samples giving values above 24 may be passed as free from suspicion, or adulterated in a manner that does not at present admit of being proved. If, on the other hand, the value obtained is less than 24, every possible means must be employed for arriving at a conclusion whether adulteration has been practised or not. When the value obtained is 20 or 18, a judicious analyst will be content to declare the sample doubtful, but not actually proved to be adulterated. He considers that such a course does not in any way lay the analyst open to reproach; but that, on the contrary, it would secure for him the respect of those competent to form an opinion from their acquaintance with the subject. As an illustration of the mode in which the analytical data obtained by these methods in testing samples of butter may be made use of as indicating their purity or adulteration, the following examples selected from actual practice are given:—

	Kottstorfer.	Hehner.	Wollny.	
1	232.4	—	22.48	
2	219.31	90.21	23.73	doubtful.
3	235.12	88.65	16.92 } 17.19 }	do.
4	228.39	89.31	18.70	do.
5	196.41	96.02	0.755	adulterated.
6	207.09	93.46	9.44	do.
7	196.34	95.58	0.75	do.
8	213.30	92.42	6.00	do.
9	218.40	91.40	15.57	do.
10	230.60	88.78	22.37	doubtful.
11	235.12	88.65	16.92 } 17.19 }	do.
12	228.39	89.31	18.70	not proved
13	234.08	87.29	20.46 }	to be
14	227.64	89.64	20.75 }	adulterated.

In the author's opinion positive proof of adulteration is afforded only in cases where the results of the different methods of testing are in perfect accord with each other.

Preservation of Solutions of Metaphenylenediamine and its Employment as a Reagent. G. Denigès. (*Journ. de Pharm. et de Chim.* [5], xxv. 591-594. From *Journ. Chem. Soc.*) Two grams of the hydrochloride are dissolved in 100 c.c. of ammonia in a stoppered flask, and 5 grams of powdered animal black is added to the solution. The whole is well shaken three or four times at intervals of an hour, and allowed to remain until next day. If the solution is not quite colourless, the shaking is repeated. The liquid can be preserved indefinitely over the animal black, and the portion withdrawn for use by means of a pipette can easily be seen to be quite limpid. To detect hydrogen peroxide, 1-2 c.c. of the reagent is heated to boiling during one minute with some drops of the liquid to be tested; in presence of the peroxide, a blue colour, more or less intense, is produced, which is perceptible after two minutes' boiling if the liquid only contains a few milligrams per litre. This coloration becomes red on the addition of soda or potash. For the detection of nitrous acid, 5 drops of the reagent are placed in a tube with 5 c.c. of 10 per cent. sulphuric acid; the mixture should not be coloured; 100 c.c. of the water to be tested are added, and heated to boiling during five minutes; a yellow colour, apparent on looking down the tube, indicates the presence of nitrites. The nitrites may be quantitatively estimated by adding nitrite solution of known strength to distilled water and comparing as in nesslerizing.

Determination of the Iodine-Absorption of Oils and Fats. D. W. Fahrion. (*Chemiker Zeitung*, 1892, 862.) The author recommends the following modified process:—About 0.150 gram of the sample is dissolved in 10 c.c. of chloroform, 10 c.c. each of iodine and mercuric chloride solutions are added, and the mixture is allowed to stand for two hours; after adding 20 c.c. of potassium iodide solution and 100–150 c.c. of water, the excess of iodine is titrated with sodium thiosulphate solution. If in the determination it be found that the blank test requires less than twice the quantity of thiosulphate solution used in the case of the oil or fat, the estimations must be repeated, using 20 c.c. each of iodine and mercuric chloride solution for 0.150 gram of oil or fat.

Detection of Sesame Oil in Olive Oil. A. Gassend. (*Chem. Centr.*, 1892, 459.) The author points out that the red coloration produced by sesame oil in the reaction with sugar and hydrochloric acid is shared by some specimens of African olive oil. On adding a small quantity of a 10 per cent. solution of sodium bisulphite, the red coloration produced by such olive oils is quickly discharged, whereas that due to sesame oil remains for more than ten minutes. In this manner they may be easily distinguished.

Test for Sesame Oil. G. Ambühl. (*Schw. Wochenschr. für Pharm.*, 1892, 381.) Sesame oil may be readily detected as an admixture in olive oil, cotton-seed oil, and oil of arachis by Baudouin's reaction with sugar and hydrochloric acid. 0.15 gram of sugar is dissolved in 20 c.c. of hydrochloric acid of not less than 1.18 specific gravity. 10 c.c. of the oil to be tested are now added, and the mixture is well shaken and allowed to separate. In the presence of sesame oil, the acid layer will immediately on separation show a distinct and permanent red coloration. In the case of pure olive, cotton-seed and arachis oils, nothing but a dirty yellowish-brown colour is produced after some time. Old, strongly rancid sesame oil gives sometimes an indigo-blue instead of a wine-red coloration.

Detection of Cineol (Eugenol) in Volatile Oils. E. Hirschsohn. (*Pharm. Zeitschr. für Russland*, 1893, Nos. 4 and 5.) 3–15 drops of the oil are agitated with 0.01–0.05 gram of iodol. If necessary, more of the oil is added drop by drop until perfect solution results; the mixture is then set aside for twenty-four hours, and examined at intervals to see whether any crystals have separated; if so, these crystals are tested for cineol by heating with solution of potassium hydrate and noting the odour. The nature of the

crystalline compound has not as yet been ascertained. By distilling the oils with steam and applying the reaction to the first portion of the distillate, the delicacy of the test is greatly increased.

Volumetric Estimations and Analytical Separations by Means of Potassium Ferrocyanide and Ferricyanide. C. Luckow. (*Chem. Zeit.*, xv. 1491-1492. From *Journ. Chem. Soc.*) The use of potassium ferrocyanide is somewhat restricted, as so many ferrocyanides are insoluble. For instance, in the important titration of zinc ores it is necessary to remove iron and other metals before titrating with the ferrocyanide. The author, therefore, has made an attempt to introduce ferricyanide instead. Having prepared a potassium ferricyanide free from sulphates and chlorides, it was found that this substance may be used in acid solutions even in presence of ferric oxide, and that no precipitates are formed in presence of mercuric, lead, manganous, uranic, and stannic salts.

These different properties of the two double iron cyanides render it possible to estimate some metals volumetrically in presence of one another, or to estimate them gravimetrically, as most ferricyanides may be readily filtered off. Zinc, for instance, may be accurately estimated either volumetrically or gravimetrically by means of potassium ferricyanide in its acetic or nitric acid solution, even in presence of lead, which may then be titrated in the filtrate with potassium ferrocyanide. Tin may be titrated by means of potassium ferrocyanide, even in presence of arsenic and antimonie acids, after the solution has been evaporated with oxalic acid and then mixed with a little dilute sulphuric acid.

The ferricyanide solution should give no coloration with a uranium solution, and no precipitate with a lead salt. If it should do so, it must be mixed with a little chlorine-water, and the salt recrystallized.

When titrating with ferrocyanide or ferricyanide, it is not possible to add the indicator straight to the liquid under examination, but use must be made of test papers. The indicator used must show either the disappearance of the last trace of the metal or else the slightest excess of the precipitant.

The author prepares his test papers as follows:—A moderately thick but dense and smooth kind of filter paper is cut into strips of 30 centimetres in length and 15 in width. Across the narrow part, at a distance of about 4 centimetres from each other, stripes are made with the solution of the indicator, which consists of cupric acetate or ferric chloride, if ferrocyanide is used ;

or cobaltous or ferrous sulphate, when a ferricyanide is employed in the titration. When both are used in succession, a mixture of ferrous ammonium sulphate and ferric chloride is used.

When apparently enough of the ferrocyanide or ferricyanide solution has been added to the solution to be tested, a little drop is taken out by means of a thin pencil and put at a distance of about 5 mm. from one of the stripes, when the reaction will make its appearance if the least excess is present.

The author recommends using for the titration not more than 30 c.c. of liquid, containing about 0.15 gram of metal. The process may also be performed by adding an excess of the reagent, and titrating this in the usual manner. But amongst the ferrocyanides, there are some, like the zinc, nickel, and cobalt salts, which are very difficult to filter off, although this presents no difficulty with mercury, lead, and silver salts. The ferricyanides are, however, more easily filterable.

Sensitive Litmus Indicator. J. Lüttke. (*Zeitschr. für analyt. Chem.*, xxxi. 692.) An indicator of great delicacy may be obtained by extracting 100 grams of litmus with warm water, concentrating the solution to 200 c.c., then mixing it with 20 c.c. of hydrochloric acid 1.12 sp. gr., and dialysing until the acid is removed. The residual colour is extremely sensitive to traces of acid or alkali. This indicator can be obtained in a solid form, possessing great stability, by mixing the concentrated solution with an excess of alcohol, and collecting, washing, and drying the precipitate thus formed.

Employment of Borax for Standardizing Acids. E. Rimbach. (*Ber. der deutsch. chem. Ges.*, xxvi. 171.) The author recommends borax, purified by two or three recrystallizations, in place of sodium carbonate, for standardizing normal acids. The best indicator for this purpose is methyl-orange, which is not affected by boric acid. 1 c.c. of normal acid corresponds with 0.190872 gram of crystallized borax, and 1 gram of the latter is equivalent to 5.2391 c.c. of normal acid.

Application of Potassium Tetroxalate in Alkalimetry. C. L. Parsons. (*Journ. Anal. Chem.*, vi. 372-380.) The author states that very exact results are obtained in alkalimetry by means of potassium tetroxalate, provided this salt is pure and has the exact composition indicated by the formula $\text{K H C}_2\text{O}_4, \text{H}_2\text{C}_2\text{O}_4 + 2\text{H}_2\text{O}$. In using it for the titration of fixed alkalis, he employs phenolphthaleïn as an indicator, but in the titration of ammonia he uses

litmus. The tetroxalate can be very easily prepared in a perfectly pure condition.

Determination of the Strength of Nitric Acid by the Specific Gravity. G. Lunge and L. Marchlewski. (*Zeitschr. für angew. Chem.*, 1892, 10-12; 330-331.) The results obtained in the determination of the strength of nitric acid by its specific gravity are too high when the acid contains nitric peroxide. The authors have therefore constructed new tables giving the corrected specific gravity when the amount of this impurity is known. The latter may be readily determined by adding the acid from a burette to a measured volume of standard permanganate solution until complete decolorization has been effected.

Volumetric Estimation of Sulphuric Acid in Soluble Sulphates. E. Stolle. (*Zeitschr. für angew. Chem.*, 1892, 234-235.) The author uses a standardized solution of barium chromate in hydrochloric acid, which is added from a burette to the solution of a weighed quantity of the substance in a 500 c.c. flask, until the sulphuric acid is completely precipitated. After adding sufficient ammonia to precipitate the excess of barium chromate, the mixture is made up to 500 c.c., filtered, and the chromic acid estimated in a measured portion of the filtrate by means of ferrous sulphate.

Volumetric Estimation of Sulphuric Acid in Alkali Sulphates. C. Cherix. (*Chem. Zeitung*, xvi. 885.) The sulphates are decomposed with barium hydrate, the excess of the latter removed by carbonic anhydride, and the alkaline carbonate determined in the filtrate by titration in the usual way. From the proportion of carbonate thus found, the amount of sulphate is readily calculated.

Gasometric Estimation of Nitric Acid. M. Gläser. (*Zeitschr. für analyt. Chem.*, xxxi. 285-288.) The presence of dissolved oxygen is known to impair the results of nitric acid estimations based on the liberation and measurement of nitric oxide. The author prevents the action of the oxygen on the nitric oxide by collecting the gas over a one per cent. solution of potassium iodide. Treatment of the gas with solution of sodium hydrate is necessary only in cases in which the substance operated upon contains carbonates.

Estimation of Phosphoric Acid in the Presence of Arsenic Acid by Means of Ammonium Molybdate. H. C. Babbitt. (*Journ. Anal. Chem.*, vi. 381.) The presence of arsenic acid is found by the author to have no disturbing effect on the accuracy of phosphoric acid estimations by this process, provided the temperature of precipitation does not exceed 25° C.

Quantitative Separation and Estimation of Chlorine, Bromine, and Iodine. C. Friedheim and R. J. Meyer. (*Zeit. anorg. Chem.*, i. 407-422.) The mixture is distilled with potassium arsenate and dilute sulphuric acid, the iodine thus passing over received in potassium iodide solution, and then titrated with sodium hyposulphite. After cooling, the residue in the retort is mixed with strong solution of potassium bichromate, the mixture distilled, the bromine now passing over absorbed by potassium iodide solution, and the iodine thus liberated titrated as before. The chloride remaining in the retort is estimated gravimetrically with silver nitrate, after acidification with nitric acid.

Assay of Sodium Nitrite. G. Lunge. (*Chem. News*, lxxv. 134.) The author considers both the aniline and sulphanilic acid methods of assay as tedious and untrustworthy, while his modification of the permanganate process gives exact results, and is at the same time simple and expeditious.

Separation of Aluminium and Lithium. K. and E. Sponholz. (*Zeitschr. für analyt. Chem.*, xxxi. 521-522.) Aluminium cannot be completely separated from lithium by means of ammonia without repeating the precipitation at least five times. By the following process, one or at most two precipitations are found to be sufficient. The dilute solution is heated with an excess of solution of ammonium acetate and gradual additions of very small quantities of ammonia to lessen the free acidity. The precipitate is collected and washed with hot water containing ammonium acetate. The presence of sulphates or of alkaline earths does not interfere with the process.

Estimation of Barium in the Presence of Calcium and Magnesium. F. W. Mar. (*Amer. Journ. Sc.*, xliii. 521-525.) One gram of the mixed chlorides is dissolved in the smallest possible quantity of boiling water, and the solution gradually and intimately mixed with 25 c.c. of fuming hydrochloric acid; after cooling, the precipitation of the barium chloride is completed by the addition of 5 c.c. of pure ether. The precipitate is collected, washed with hydrochloric acid containing 10 per cent. of ether, dried at 150-200° C., and weighed. The results are stated to be very satisfactory.

Separation of Barium from Strontium and Calcium by Rose's Method. E. Kouklin. (*Journ. Russ. Chem. Soc.*, xxii. 326.) The author finds that Rose's method for separating barium from strontium and calcium, by boiling the solution of their salts with an excess of a solution containing potassium carbonate and sulphate,

gives correct results provided the solution employed contains the two potassium salts in the proportion of five parts of sulphate to one of carbonate. In this case the amount of strontium sulphate formed is so exceedingly small as to remain in solution. The barium is completely precipitated as sulphate, and the strontium as carbonate, with the exception of the trace just alluded to, which passes into solution as sulphate.

Note on the Dry Test for Chromium. L. W. McCay. (*Chem. News*, lxx. 221.) The author points out that when the yellow fused mass obtained by heating chromium compounds with sodium nitrate is dissolved in water, the solution, after acidification, often assumes a greenish or greyish blue colour instead of the reddish yellow one characteristic of alkaline bichromates. This is due to the formation of nitrite in the fusing mass, and the subsequent reduction of the chromate by the liberated nitrous acid.

Detection and Estimation of Minute Quantities of Lead in the Presence of Copper and Iron. F. L. Teed. (*Analyst*, xvii. 142-143.) Traces of lead may be detected and estimated in lemonade and similar beverages by the following process:—A measured quantity of the lemonade is mixed in a cylinder or white basin with a few c.c. of ammonia, a few drops of solution of potassium cyanide, and then with a drop of ammonium sulphide. The presence of lead will be indicated by the dark coloration produced, and its quantity can be estimated by imitating the coloration with known quantities of lead precipitated under the same conditions. Iron does not interfere with the test, as it is kept in solution by the tartaric acid, and is then converted by the potassium cyanide into a ferro- or ferri-cyanide, which is not affected by ammonium sulphide. In the case of liquids not containing tartaric acid, a little of this acid should be added if iron is likely to be present. Copper does not interfere with the test, as copper sulphide is soluble in potassium cyanide.

As a very delicate test for the detection of lead in sulphuric acid, the author proposes the addition to the strong acid of a drop of hydrochloric acid or of a small crystal of common salt. Chloride of lead is thus precipitated and recognised by a peculiar pearly opalescence of the liquid.

Separation and Estimation of Lead, Silver, and Zinc in Galena and Blende. E. Aubin. (*Bull. de la Soc. Chim.* [3], vii. 134-135. From *Journ. Chem. Soc.*) The author recommends the following rapid process for the commercial analysis of galenas and blendes. The powdered mineral (10 grams) is treated with

fuming nitric acid (50 c.c.) in a conical flask (1 litre); the whole is then evaporated to dryness on the sand-bath, taken up by nitric acid (20 c.c. of sp. gr. 1.33), and the solution diluted to about 400 c.c. with water. The siliceous gangue and lead sulphate are now collected on a double tared filter, and after being washed, dried, and weighed, the lead sulphate is extracted from the weighed precipitate by trituration in a glass mortar with hot sodium tartrate solution (20 per cent.). The siliceous gangue remains unchanged, and is again collected on the tared filters and weighed; the weight of lead is thus determined. The liquid containing the silver and zinc is now made up to a standard volume (500 c.c.); in part of this (50 c.c.), after separating the iron and aluminium by ammonia, the zinc is precipitated with ammonium hydrosulphide, and the precipitate collected and dissolved in hydrochloric acid; the solution, after being filtered, is precipitated hot with sodium carbonate, and the zinc weighed as oxide. The remaining liquid (450 c.c.), containing the silver, is rapidly evaporated to 20–30 c.c. and cooled, the clear solution is decanted from the crystalline deposit, and pure sodium chloride (1 gram) added to it to precipitate the silver as chloride; this is then collected, dried, and weighed on a double tared filter.

Detection of Traces of Gold. T. K. Rose. (*Chemical News*, lxi. 271.) The author's method is based on the purple of Cassius reaction. When several litres of boiling water are poured into a large beaker containing 10 c.c. of a saturated aqueous solution of stannous chloride, acidified with hydrochloric acid, so as to mix the two liquids as rapidly as possible, a yellowish white gelatinous precipitate of stannous hydrate is produced. But if the water contain the smallest trace of gold, the precipitate appears distinctly purple red, owing to the purple of Cassius simultaneously formed. It is stated that one part of gold in 100,000,000 can thus be detected.

Conversion of Arsenic into Arseniuretted Hydrogen for the Purpose of its Quantitative Estimation. F. W. Schmidt. (*Zeit. anorg. Chem.*, i. 353–359.) The author finds that the conversion of arsenic into arseniuretted hydrogen may be rendered complete by the addition towards the end of the operation of a hydrochloric acid solution of stannous chloride to the contents of the vessel in which the gas is evolved. By this addition the arsenic still remaining in the liquid is precipitated in a very finely divided state, in which it is readily acted upon by the nascent hydrogen and converted into AsH_3 .

Volumetric Estimation of Arsenic Acid. G. Franceschi. (*L'Orosi*, xv. 192-194.) The process recommended by the author consists in the precipitation of the arsenate in neutral solution by ferric chloride, potassium sulphocyanide being used as an indicator. No sodium acetate is to be employed in this process.

Improvements in Reinsch's Test for Arsenic. J. Clark. (*Proc. Chem. Soc.*, No. 124.) Reinsch's process, as carried out in the ordinary way, is capable of demonstrating the presence of very minute quantities of arsenic, and, according to Letheby, it withdraws every, and the smallest, trace of arsenic from organic mixtures; but there are two objections to its use in medico-legal cases.

1st, When the quantity of arsenic is small, a stain is obtained which it is sometimes difficult to identify as arsenic, because the coated copper, when heated, is apt to give a layer of chloride of copper and organic matter, instead of arsenious acid; and, 2nd, It is not suitable for the quantitative estimation of arsenic, as it is not possible by means of heat to volatilize the whole of the arsenic from the copper.

The author's improvements consist in identifying the arsenic or antimony on the copper with greater certainty, and at the same time estimating the amount of each when they occur together. For this purpose he digests the coated copper in a cold mixture of dilute caustic potash and peroxide of hydrogen, which dissolves the arsenic and antimony, and converts them into arsenate and antimonate of potassium. The solution is then boiled, filtered, to get rid of the oxide of copper, evaporated to a small bulk, and distilled with ferrous chloride and strong hydrochloric acid. The distillate is then saturated with sulphuretted hydrogen, and the arsenic weighed as sulphide, after being freed from traces of sulphur by washing with carbon bisulphide and alcohol. The residual liquid, from which the arsenic has been thus removed by distillation, is then tested for antimony.

Quantitative Spectrum Analysis. G. and H. Krüss. (*Zeit. anorg. Chem.*, i. 104-125.) This paper is divided into three sections:—1. Comparison of various methods of quantitative spectrum analysis. 2. Influence of temperature on the absorption spectrum of coloured solutions. 3. Improved form of Vierordt's Spectrophotometer. A drawing is given of the apparatus given in the third section. For particulars the original should be consulted.

Employment of Ferrous Sulphate in Agriculture. H. Boiret

and G. Paturel. (*Ann. Agron.*, xviii. 418-440.) The authors consider ferrous sulphate as beneficial only in such soils as contain an excess of lime, its chief effect consisting in the production of gypsum. It causes no increase in the proportion of phosphoric acid in the crops, nor any decrease in that of the potash, as has been previously stated.

MATERIA MEDICA AND PHARMACY.

PART II.

MATERIA MEDICA AND PHARMACY.

Sarsaparilla. R. Kobert. (*Pharm. Rundschau*, 1892, 611.) The glucosides of sarsaparilla, when injected into the blood, have a poisonous action which is not produced by their internal administration, as they are not absorbed into the system except by injured membranes. The author is opposed to the simultaneous administration of mercurials and sarsaparilla, since the lesions of the intestinal membranes frequently caused by the former may allow of the absorption of the poisonous glucosides.

Valeriana Officinalis var. Angustifolia. Y. Shimoyama and K. Hyrano. (*Apotheker Zeitung*, vii. 439.) The authors have examined the root of the Japanese variety of valerian, which differs slightly from *Valeriana officinalis*. The root yields a somewhat larger proportion (2.7 per cent.) of volatile oil. The latter has a specific gravity of 0.805 at 17° C. and is laevorotatory. Valerianic acid was detected in the aqueous distillate.

Ipomœa Pandurata. M. Kromer. (*Pharm. Zeitschr. für Russland*.) From the root of this plant, which is employed in America as a remedy for calculus, the author has obtained a glucoside of the formula $C_{78}H_{132}O_{36}$, differing from those contained in other Convolvulaceæ. A description of this body, *ipœmein*, and of some of its decomposition products, will be found in the paper.

Ipecacuanha freed from Emetine as a Therapeutic Agent. M. Kanthack and A. Caddy. (*Practitioner*, i. 411.) The authors have investigated the therapeutic value of ipecacuanha deprived of its emetine, and their results confirm the observation that such a drug proves a most satisfactory remedy in cases of acute dysentery, and is free from the disadvantage of causing depression or nausea so often produced by even small doses of the ordinary root. It appears from these researches that the antidyenteric value of

ipecacuanha does not depend on the emetine present in it, and preparations are now being made and tried from which the alkaloid has been removed while the antidyenteric principle is retained. Experiments in this direction are still in progress.

The Assay of Ipecacuanha. G. Kottmayer. (*Pharm. Post.*, 1892, 913 and 933.) The author criticises various methods in use for the assay of ipecacuanha, and suggests the following process, which he finds to give the most exact results:—The powdered root should be used without drying, since heating renders the extraction of the alkaloid more difficult; the moisture should therefore be estimated in a separate portion. 15 grams of the powdered root are placed in a bottle with 148 c.c. of 90 per cent. alcohol and 2 c.c. of hydrochloric acid of sp. gr. 1.12 (measured at 15° C.), and digested, with frequent agitation, at 40° C. for four days; after cooling to 15° C., 100 c.c. are removed, mixed in a capsule with 20 c.c. of a 10 per cent. alcoholic lead acetate solution (50 per cent. of alcohol), and, after the addition of 1.5 grams of slaked lime, evaporated, with occasional stirring, to a pasty consistency; 5 grams of powdered glass are then incorporated, and the heating is continued on a water-bath with constant stirring until a dry powder results. This is extracted for ten hours with chloroform, the chloroform solution evaporated in a weighed vessel, dried at 100° C., and weighed. The crude alkaloid thus obtained is dissolved in 2 c.c. of normal hydrochloric acid, the insoluble matter collected on a weighed filter, thoroughly washed, dried, and weighed. The total residue minus the weight of the insoluble resin leaves the weight of the pure alkaloid.

The methods of assay tested by the author were as follows:—

1. Zinoffsky's method (titration with Mayer's reagent).
2. Flückiger's method (extraction with hot ammoniated chloroform).
3. Flückiger's method modified by Kremel (dissolving the residue in dilute acid, liberating the alkaloid with ammonia, and extracting with chloroform).
4. Kremel's process (drying a paste made of the root, lime, and water, and extracting with chloroform).
5. Extraction of the root with ammoniated alcohol, evaporating to dryness, and exhausting with chloroform.
6. A modification of Lloyd's method.
7. The author's process as described above.

No. 1 gave very discordant results, and was therefore rejected, Nos. 3, 4, and 5 all gave low results, and in the case of No. 6 the

alkaloid was obtained in a very impure condition. The results are tabulated as follows:—

Ipecacuanha.	Percentage of alkaloid.					
	2.	3.	4.	5.	6.	7.
Rio . . .	8.09, 3.12, 3.00	1.72, 1.86	1.72	1.74	2.60	2.37, 2.24
Singapore .	3.04	1.62, 1.74	—	—	—	2.22, 2.30
Carthagenia	2.24, 2.10	1.23, 1.88	—	—	—	1.81

Ipecacuanha Root. MM. Caesar and Loretz. (*Apoth. Zeit.*, vii. 464. From *Pharm. Journ.*) The authors have examined samples of ipecacuanha collected in Central America and imported from Rio, as well as a sample imported from Panama, known as Carthagenia ipecacuanha, and a third kind cultivated in Singapore. The determination of the relative proportions of bark and wood gave the following results:—

		Bark.	Wood.
Rio ipecacuanha .	Best quality .	77	23
" " .	Second quality .	65.5	34.5
Carthagenia .	" .	84	16
" .	Selected .	91.5	8.5
Singapore .	" .	91	9

The average percentage amounts of pure emetine in these samples was:—

		Per cent.
1. Rio ipecacuanha .	Best quality .	1.45
2. " " .	Selected .	1.05
3. " " .	Second quality .	0.65
4. " " .	Inferior quality .	0.53
5. Carthagenia .	Selected .	1.85
6. " .	Best quality .	1.40
7. " .	Second quality .	0.90
8. Singapore .	Imported 1891 .	0.54
9. " .	Woody portion .	0.23

The method of examination adopted for the determination of emetine gave a purer product than Flückiger's method, and the purity of the emetine is considered to be important for correct comparison.

The Singapore drug closely resembles that of Rio; but though it is of tolerably good quality, it cannot be expected to form any considerable addition to the supply for some time to come. The Carthagenia drug is described as having a reddish-brown or frequently dirty greyish-brown colour. The roots are from 4 to 8 centimetres thick, 15 centimetres long; they have but slight vermicular contortions, with less prominent thin projections at

both ends, and present distinct puffed-out rings without deep constrictions. The cortical portion is grey inside, presenting a compact horny texture, and it is readily separable from the yellowish-coloured woody medullum. A fourth kind of *ipeacacuanha*, imported into London as East Indian, is described as being entirely distinct from the root of *Cephaelis Ipecacuanha*; and when the powdered drug was tested for emetine, as directed in the *German Pharmacopœia*, it gave no indication of the presence of an active constituent.

The Assay of Ipecacuanha. C. C. Keller. (*Pharm. Zeitung*, xxxviii. 23.) 10 grams of the dried and finely powdered root are well agitated in a bottle of 150 c.c. capacity with 40 grams of chloroform and 60 grams of ether. 10 grams of solution of ammonia are then added, and the agitation repeated at frequent intervals during one hour, after which another 5 grams of solution of ammonia are added, and again well agitated with the mixture. After settling, 50 grams of the decanted solution, representing 5 grams of the dried root, are carefully distilled in a weighed Erlenmeyer flask; the varnish-like residue is twice treated with 10 c.c. of ether, and evaporated by forcing a current of air through the flask. After the last traces of ether have been removed, the residue is dried in a water-bath and weighed. For the titration of the alkaloid it is dissolved in 10 c.c. of absolute alcohol with the aid of heat, sufficient water added to produce a permanent turbidity, and the titration then carried out with decinormal hydrochloric acid in the presence of a few drops of hæmatoxylin solution as an indicator. Each c.c. of the decinormal acid represents 0.0254 gram of emetine. An improvement of this assay consists in the removal of the fat from the *ipeacacuanha* root by percolation with ether previous to the process described. This preliminary treatment renders the subsequent titration more easy and distinct.

The author disagrees with the statement recently published by Cæsar and Loretz that the best qualities of *ipeacacuanha* root do not contain more than 1.85 per cent. of emetine. From his own results he concludes that a standard of 2.5 per cent. would not be too exacting.

Constituents of Bryony Root. G. Masson. (*Journ. de Pharm. et de Chim.*, xxvii. 300.) The author has isolated from this root two principles, bryonin and bryoresin, answering respectively to the formulæ $C_{34}H_{24}O_9$ and $C_{37}H_{34}O_{18}$. The former is a glucoside occurring in the dried root to the extent of 1-1.2 per cent. Its decomposition by boiling with dilute acids yields glucose, a resin,

and bryogenin, $C_{28}H_{49}O_4$. Bryoresin exists in the root in alkaline combination, and possesses purgative effects.

Some Products of Cassava. E. E. Ewell and H. W. Wiley. (*Amer. Chem. Journ.*, vol. xv. No. 4.) Some four years ago one of the authors described a plant which has been grown in Florida for many years under the name of sweet cassava, the botanical name of which is *Jatropha manihot* or aipi. From the analysis made at that time it was found that the plant was valuable for feeding purposes, being very rich in carbohydrates, although rather poor in albuminoids. Lately the subject has been studied to a much greater extent with the object of preparing as large a number of products as possible from the plant, with the determination of their chemical properties and food values.

A large quantity of the root was obtained from Florida, the bark separated from the root, and each subjected to analysis with the following results:—

	Peeled root.		Fibre after removal of starch.	Bark of root.	
	Fresh.	Dry.	Dry.	Fresh.	Dry.
Moisture	61.80	—	—	61.80	—
Ether extract	0.17	0.44	0.80	0.66	1.70
Albuminoids (nitrogen $\times 6.35$) . .	0.64	1.66	1.02	2.29	5.91
Starch (diastase extract inverted with HCl)	30.98	80.06	64.64	—	—
Fibre	0.88	2.26	10.68	8.88	9.89
Ash	0.51	1.81	1.42	2.02	5.23
Undetermined	5.52	14.27	21.94	29.90	77.27
	100.00	100.00	100.00	100.00	100.00

With the starch in the analysis given above are reckoned also the soluble carbohydrates, consisting almost exclusively of cane sugar, and of which, in an analysis of another portion of the dry substance, as much as 17 per cent. was found. The undetermined portion consists of the digestible fibre and carbohydrates of the pentose series.

The ash of the peeled root was found to contain almost one-half of its total weight of potash salts, chiefly in the form of carbonate and phosphate. In the ash of the bark, silica was found to be the predominant constituent, amounting to more than 50 per cent.

Quite a number of preparations were made from the starch of the root, including tapioca, glucose, alcohol, and cane sugar.

The general result of the authors' investigation tends to demonstrate that the cassava is a plant of high economic value, and worthy of the attention of those interested in the carbohydrate products of the country.

Starches in Root Drugs. E. S. Bastin. (*Apothecary*, December, 1892.) The starches reported upon by the author are those of *Sarsaparilla*, *Rhatany*, *Bryonia*, *Stillingia*, *Phytolacca*, *Pareira*, *Althæa*, *Licorice*, *Ipecacuanha*, *Gelsemium*, *Calumba*, *Belladonna*, *Sumbul*, *Rhubarb*, *Rumex crispus*, *Piper methysticum*, *Asclepias*, *Symphytum*, *Masterwort*, and *Apocynum*. As the descriptions do not admit of useful condensation, the reader is referred for particulars to original article, or to a reprint of it in *Pharm. Journ.*, 3rd series, xxiii. 747-748 and 769-770.

Constituents of the Root of *Corydalis Cava*. M. Freund and W. Josephy. (*Ber. der deutsch. chem. Ges.*, xxv. 2411-2415.) The basic constituent of this drug, known in commerce as "corydaline," is obtained as follows:—The finely-cut roots are extracted with alcohol, the alcohol distilled off, and the aqueous solution which remains filtered from resin; ammonia is then added to the filtrate, and the precipitated base extracted with ether. On concentrating the ethereal solution, a product is first obtained which melts about 160°; but the mother liquors, if further concentrated and mixed with alcohol, yield a crystalline precipitate, which is purified by recrystallization from alcohol. The "corydaline" thus obtained melts at 126-130° C. The authors have examined this product, and find that it consists at least of three distinct alkaloids; viz., *corydaline*, $C_{22}H_{37}NO_4$, fusing at 134.5°, and possessing the properties assigned to it by Dobbie and Lauder (*Year-Book of Pharmacy*, 1892, 49); *bulbocapnine*, $C_{34}H_{36}N_2O_7$, differing from corydaline by being soluble in an excess of alkali, and fusing at 198-199° C.; and *corycavine*, $C_{23}H_{23}NO_6$, which melts at 214-215°, and is less soluble in absolute alcohol than corydaline, but, like the latter, insoluble in alkalis. The further investigation of these two new bases is proceeding.

Constituents of *Corydalis Nobilis*. E. Birsmann. (*Pharm. Post.*, 1892, 1304.) The author has isolated from the root of this plant six distinct alkaloids, of which two are described in this paper, while the remaining four are still under investigation. Indications of the presence of hydroberberine and berberine were also obtained.

A False "Bikhma." C. J. H. Warden and C. L. Bose. (*Pharm. Journ.*, 3rd series, xxiii. 302-305.) Bikhma (also called Bickhma or Bishma) is the Indian name for *Aconitum palmatum*. The spurious drug reported upon by the authors was obtained from the Monghyr district, and consisted of rhizomes entirely different from those of the true *Aconitum palmatum*. In their opinion they may possibly be derived from *Acanthophyllum macrondon* or *Gypsophila paniculata*. The most important constituents were found to be saponins. A full description of the drug will be found in the original article.

The "Earth Sugar" Root of the Tamils. D. Hooper. (*Pharm. Journ.*, 3rd series, xxiii. 548-549.) This drug has been known in Southern India for centuries, and has been employed as an alterative, stimulant, tonic, and as a remedy for skin diseases. Its botanical origin has only recently been discovered by M. A. Lawson, who examined a flowering and fruit-bearing specimen of the plant received from Dr. Mootoosawmy, of Tanjore, and identified it as *Mesua arenaria*, belonging to the natural order *Capparidæ*. This plant has been described by Roxburgh under the name of *Capparis heteroclita*. It is a large unarmed climbing shrub; leaves elliptic, corymbs terminal, calyx four-cleft; corolla regular, four-petalled; stamina on the receptacle, which is as long as the tube of the calyx. The most remarkable part of the plant is the fruit; this is a beaked berry 2 to 5 inches long, deeply constricted between the seeds, fleshy, elongate, moniliform, one or more seeded. There is only one seed in each single berry or lobe of the compound fruit.

The roots are plump when fresh, from 1 to 1½ inches in diameter, long, cylindrical, contorted, with a light brown surface. When dried they become darker in colour and wrinkled longitudinally, and several irregularly disposed transverse markings of a lighter colour are observed on the surface. The transverse section of the root exhibits a central hard woody centre of a yellowish colour, and several similar but smaller woody bundles are scattered throughout the waxy-looking parenchyma of the cortical portion. In the bazaars the drug is sold in circular discs, like calumba root, having been sliced transversely when in a fresh state and allowed to dry in the sun. The taste is sweet and mawkish, and there is no distinctive odour as there is in liquorice root. The outer brown covering of the root is supposed to be harmful, and is removed previous to use.

From an analysis of the drug, which reveals nothing but the

ordinary plant constituents, the author inclines to the opinion that it possesses very little, if any, real medicinal value.

Gillenla Stipulacea. G. L. Curry. (*Amer. Journ. Pharm.*, October, 1892, 513-514.) The author has isolated from the root of this plant a white crystalline glucoside for which he proposes the name *gillein*. A dose of $\frac{1}{4}$ -grain is sufficient to produce nausea approaching emesis. The glucoside is coloured red by sulphuric acid, and yellow by nitric acid, and it deepens the colour of solution of chromic acid. It differs in these characters essentially from *gillenin* obtained by W. B. Stanhope from *Gillenla trifoliata*. The author's analysis also shows the presence in this drug of sugar, gum, extractive, and a tannin striking a greenish-black colour with a solution of ferric chloride.

The drug is best administered in the form of a decoction or of a ten per cent. tincture made with alcohol of 50 per cent.

Eupatorium Perfoliatum. H. F. Kaercher. (*Amer. Journ. Pharm.*, October, 1892.) A quantity of the root collected in Ohio was dried and submitted to proximate analysis with the following results:—

	Per cent.
Fat and resin (soluble in ether)	0.60
Resin and active bitter principle	1.59
Glucoside	undetermined
Mucilage	1.75
Dextrin	3.00
Glucose	1.45
Saccharose	5.60
Undetermined extractive (soluble in water)	4.90
Soluble in dilute sodium hydrate solution	2.42
Soluble in diluted hydrochloric acid	2.70
Inulin	4.90
Other products (soluble in hot water)	3.40
Lignin	17.62
Cellulin	24.69
Ash	10.67
Moisture	12.40

Eupatorium Perfoliatum. C. H. Shamel. (*Amer. Chem. Journ.*, xiv. 224-225.) The dried plants, gathered at the period of flowering, were extracted with hot alcohol for several hours. The alcohol was distilled off, and the residue treated with dilute hydrochloric acid, whereby a black, gummy mass separated, which was removed by filtration. The filtrate was neutralized

with sodium carbonate and extracted with ether. On evaporation of the ethereal solution, the active principle, *eupatorin*, was deposited as a yellow powder. It contains no nitrogen, does not fuse, but decomposes at 250° , is insoluble in water and in concentrated sulphuric and hydrochloric acids, but dissolves in dilute nitric acid forming a light-brown solution, which, when allowed to evaporate spontaneously, furnishes beautiful prisms and six-sided plates. These crystals of the nitrate are readily soluble in water, and the solution has a strong toxicological effect. They melt at $102\text{--}103^{\circ}$, and, when deprived of their water of crystallization, have a composition corresponding to the formula $\text{C}_{20}\text{H}_{25}\text{O}_{36}, \text{HNO}_3$.

Assay of Jalap Root. F. H. Alcock. (*Pharm. Journ.*, 3rd series, xxiii. 107.) The author considers that the official process and its modifications for the assay of jalap do not give entire satisfaction, and recommends in their place a method based on the great solubility of jalap resin in amylic alcohol, and the comparatively slight solubility of this alcohol in water. The *modus operandi* is as follows:—Place one gram of powdered jalap—free from agglutinated lumps—in a suitable bottle, add 20 c.c. of amylic alcohol, and shake well from time to time. After a few hours, strain the liquid off through a little cotton wool into a glass separator, wash out the bottle with 5 c.c. of amylic alcohol, and place the washings on the marc in the funnel; repeat with 5 c.c. more if necessary, so as to ensure the presence of all the resin in the separator.

Now shake up the amylic solution of the resin with small quantities of water at 50°C . (equal measures of hot and cold water will do), set aside for the liquids to separate, remove the lower aqueous layer, and repeat the washing with water until nothing more of a non-resinous nature is removed. Afterwards transfer the solution of the resin to a weighed dish containing 10 c.c. of distilled water, wash out the separator with a little amylic alcohol, placing the washings in the dish, evaporate on a water-bath in the usual way, and when dry, weigh.

The advantages claimed for this method are:—

1. That less of the water-soluble matter is removed than by the official process.

2. After careful treatment with the amylic alcohol no resin remains, rectified spirit dissolving from the residue only water-soluble matters and no resin.

3. It is a cheap process because common fusel oil once distilled can be used, but in this case more water-soluble matter is removed and more washing required.

The author's examination of many samples of commercial powdered jalap confirms the often-expressed opinion that the official standard of 10 per cent. of resinous constituents is too high at the present date.

Constituents of *Scorzonera Hispanica*. E. O. v. Lippmann. (*Ber. der deutsch. chem. Ges.*, xxv. 3220-3221.) The author has detected the presence of coniferin and small quantities of vanillin in this plant. He succeeded in isolating the former, but the latter could not be separated from other aldehydic substances present.

Constituents of the Tubers of *Stachys Tuberifera*. A. v. Planta and E. Schulze. (*Landw. Versuchs-Stat.*, xli. 123-129.) The most prominent constituent is stachyose, which the authors find to amount to 14.2 per cent. in the fresh, and 73.0 per cent. in the dry tubers. Its proportion in the sap is 15.6 per cent. Besides this the tubers contain a second carbohydrate, which yields furaldehyde by De Chalmot and Tollens' method, and yields a pentose when treated with dilute acids. It exists in the dry tubers to the extent of 3.5 per cent.

The alkaloid resembling betaine, isolated from these tubers by A. v. Planta a few years ago (see *Year-Book of Pharmacy*, 1891, 164), is more fully described in this paper under the name *stachydrine*. It forms colourless, transparent, deliquescent crystals, melting at 210° C., and having a composition represented by the formula $C_7H_{13}NO_2$.

***Rauwolfia Serpentina*.** C. J. H. Warden and C. L. Bose. (*Pharm. Journ.*, 3rd series, xxiii. 101-102.) The root of *Rauwolfia serpentina* has been previously investigated with regard to its proximate composition by one of the authors, who noted the presence of one or more alkaloidal principles. The present paper deals chiefly with the reactions and physiological properties of an alkaloid for which, pending further researches, they propose the provisional name of *pseudobrucine*. It resembles brucine in many respects, but differs from it in others. The following table shows the comparative behaviour of the two alkaloids towards reagents:—

Reagent.	Brucine.	Alkaloid suspected to be Brucine.
Conc. sulph. acid containing a trace of nitric acid.	Pink.	Yellow.
Conc. hydroc. acid . . .	Colourless.	Yellow.
Acetic acid	Colourless.	Yellow.
Conc. nitric acid . . .	Scarlet, soon passing into yellow.	Scarlet, does not become yellow so soon as the brucine, but only after standing for some time.
Sulph. acid and bichromate of potash.	Yellow with tinge of red.	Slight purple, not unlike the strychnia reaction, but not so marked.
Sulphuric acid and MnO_2 .	Orange.	Violet changing to dark brown.
Chlorine	Red: colour soon discharged, decolorized by ammonia.	Red: colour not so soon discharged, decolorized by ammonia.
Mercurous nitrate, with slight excess of HNO_3 .	Pink on warming, colour deepens on standing.	Yellow on warming, but no pink colour.
Mayer's reagent . . .	Pale yellowish ppt., flocculent.	Pale yellowish ppt., flocculent.
Nitric acid and $SnCl_2$.	Purple discharged by excess of both reagents.	No purple colour.
Sulphuric acid and potassium nitrate.	Red changes soon into yellow.	Red, with greenish purple tint at the edges; red colour deepens on standing.
Sulphocyanide of potassium.	White ppt., sol. in excess of acetic acid, reprecipitated by $NaHO$.	White ppt., sol. in excess of acetic acid, reprecipitated by $NaHO$.
Bichromate of potassium in acetic acid solution.	Copious yellow ppt., with difficulty soluble in large excess of acetic acid.	Copious yellow ppt., with difficulty sol. in large excess of acetic acid.
Platinic chloride . . .	Thick yellowish flocculent ppt., with difficulty soluble in acetic acid, but with exception of a few flocks completely soluble in $NaHO$.	Thick yellowish flocculent ppt., readily sol. in acetic acid, but almost insoluble in $NaHO$.
Auric chloride	Dirty white flocculent ppt., soon changing to flesh colour, soluble in excess of acetic acid, but insol. in $NaHO$.	Beautiful purplish red ppt., soon changing to dirty brown, with a green tinge, sol. in excess of acetic acid, but insol. in $NaHO$.
Potassium ferro-cyanide.	Light yellow ppt., soluble in dilute H_2SO_4 . The presence of acetic acid in slight excess prevents precipitation.	Light yellow ppt., sol. in dil. H_2SO_4 . The presence of acetic acid in slight excess does not prevent precipitation.
Alcoholic solution of iodine.	Alcoholic solution of alkaloid, rosette crystals.	Alcoholic sol. of alkaloid, no crystalline forms on microscopic examination.

Comparative physiological experiments with pseudobrucine and brucine on frogs showed the former to be weaker and slower in its action.

The authors intend to determine the ultimate composition, etc., of pseudobrucine as soon as they are satisfied that they have obtained it in the pure state.

The root is employed as a domestic remedy in the treatment of a large number of affections, but there seems to be no evidence to indicate that it is supposed to possess any toxic properties.

Dioscorea Batatas. F. W. Meink. (*Amer. Journ. Pharm.*, March, 1893.) This plant is indigenous to Central Asia, and belongs to the natural order of Dioscoreaceæ. The author's analysis of the tubers shows the presence of a glucoside in addition to the ordinary plant constituents.

The Tubers of Dioscorea Species. J. M. Maisch. (*Amer. Journ. Pharm.*, March, 1893.) Heckel and Schlagdenhauffen have recently investigated the tubers of *Dioscorea bulbifera* (*Revue des Sciences natur. appl.*, March, 1892), and ascertained that in the Gaboon country of tropical Africa the aerial tubers are looked upon as being decidedly poisonous, while in other French colonies they are considered inoffensive. Their investigation shows that the aerial tubers procured from the Gaboon country contain a bitter glucoside possessing poisonous properties, while the underground tubers are entirely free from this toxic principle. In connection with this subject the author refers to the detection of a glucoside in the aerial tubers of *D. Batatas* (preceding abstract), and suggests a further investigation to determine whether this also possesses poisonous properties. He also gives a tabulated summary of the results of analyses hitherto published of various species of *Dioscorea*.

Phytolacca Decandra. H. Trimble. (*Amer. Journ. Pharm.*, June, 1893.) A concentrated alcoholic percolate of poke root was precipitated by water, and the separated precipitate purified by solution in alcohol and precipitation by chloroform; this precipitate was dissolved in potassium hydrate solution and precipitated by diluted sulphuric acid, then dissolved in alcohol and precipitated by ether. The dried and finished product was obtained as an amorphous, greyish, scaly, somewhat glistening powder, which caused much frothing on being shaken with water. Its taste was slightly bitter and acrid, and when inhaled it acted as a sternutatory. It was slightly soluble in cold and boiling water, soluble in alcohol, insoluble in ether and chloroform. Acetic

acid dissolved it with the aid of heat, and formed a jelly on cooling. Alkalies formed with it soluble, amorphous compounds that scaled on drying. Sulphuric acid, when concentrated, dissolved it with a cherry-red colour, changing to violet and purple. On the application of heat, the substance commenced to decompose at about 208° without fusing, and at a higher temperature it was consumed without leaving an appreciable residue. On combustion numbers were obtained corresponding to the formula $C_{64}H_{32}O_{23}$ for the substance dried in an air-bath at $110^{\circ}C$. It is suggested that this constituent is probably a saponin.

The Activity of Male-Fern (*Aspidium Filix Mas*). R. Kobert. (*Pharm. Post.*, 1892, 1325.) The author points out that the anthelmintic action of this drug is by no means solely due to the filicic acid, but in a great measure also to the volatile oil contained in the rhizome and also in the fixed oil extracted from it.

Tonicide Action of Cascara Sagrada. J. Stephens. (*Pharm. Zeitung*, January 14th, 1893.) The author has employed a mixture of 24 grams of fluid extract of cascara sagrada with 100 grams of syrup of orange as a successful remedy for tapeworm. It is given in doses of three teaspoonfuls to adults and one and a half teaspoonfuls to children.

Cascara Sagrada. Isolation of the Active Principle. M. Leprieux. (*Comptes Rendus*, cxv. 286-288.) The author's investigation of the bark of *Rhamnus Purshiana* has led to the isolation of a crystalline constituent of the composition $C_{12}H_{10}O_6$, which he regards as the active principle, and for which he suggests the name *cascarin*. It may be obtained by the following process. The powdered bark is treated with a hot solution of sodium carbonate, the infusion neutralized with dilute sulphuric acid, filtered, and the filtrate evaporated in a vacuum. After drying the residue at $60^{\circ}C$, it is extracted with acetone, the solution acidulated with dilute sulphuric acid and poured into a large quantity of hot water. The deposit thus formed is collected after twenty-four hours and purified by a repetition of the treatment with acetone, etc. The product crystallizes in minute, prismatic needles of an orange-yellow colour, free from odour and taste, insoluble in water, slightly soluble in chloroform, and readily so in alcohol, in mixtures of alcohol and ether, and in aqueous solutions of alkalies. These alkaline solutions have a purplish-red colour.

The Active Constituent of Cascara Sagrada. Identity of Cascarin with Rhamnoxanthin. T. L. Phipson. (*Comptes Rendus*, cxv. 474.) The yellow crystalline principle isolated by

Leprince from the bark of *Rhamnus Purshiana*, and described under the name of cascarin (see preceding abstract), is regarded by the author as identical with rhamnoxanthin obtained by him in 1858 from the bark of *Rhamnus Frangula*, and first observed in the latter by Buchner in 1853.

Mangrove Bark. (*Kew Bulletin*, cxx. 227.) The bark of the mangrove tree, *Rhizophora mangle*, yields 33 per cent. of extract and 25 per cent. of a characteristic tannin, giving rise to the formation of an insoluble red colouring matter on boiling with dilute acids. The inspissated juice is inferior for tanning purposes to gambier.

Mangrove Bark. H. Trimble. (*Pharm. Journ.*, February, 1893.) The author's examination shows this bark to contain 23.92 per cent. of tannin (equal to 27.19 per cent. in the absolutely dry bark), 12.04 per cent. of moisture, 1.72 of mucilage, 0.81 of glucose, 7.02 of albuminoids, 4.27 of starch, 27.49 of cellulose, 6.10 of ash (containing a large proportion of sodium chloride), an undetermined quantity of red colouring matter, and traces of fat and wax. The tannin, which is the most important constituent, has a composition corresponding to the formula $C_{25}H_{25}O_{11}$, and appears to be identical with the tannin of horse-chestnut, rhatany, and tormentil, and possibly also with that of mimosa or wattle bark.

Paracoto Bark. O. Wallach and T. Rheindorff. (*Liebig's Annalen*, cclxxi. 300-308.) In the course of the extraction of the therapeutic constituents of this bark, a volatile oil is obtained as a bye-product, which the authors find to be composed chiefly of methyleugenol and a levorotatory sesquiterpene, *cadinene*, which has also been observed to occur in the oils of cubebs, savin, cadinum, betel, camphor, galbanum, olibanum, asafoetida, patchouli, juniper, and coto-bark. The three products isolated from this oil by Jobst and Hesse are regarded by the authors as mixtures.

Geoffroya Barks. O. Hiller-Bombien. (*Archiv der Pharm.*, 1892, 513-548; *Amer. Journ. Pharm.*, January, 1893.) The controversy regarding the origin of these barks, which were used as anthelmintics during the last and the beginning of this century, was never decided, but was gradually forgotten with the omission of the barks from the various Pharmacopœias. The "grey barks" of the time were derived from species of *Geoffroya*, and the "yellow barks" from a species of *Xanthoxylon*. Hütten-schmied in 1824 isolated from the "grey bark" an alkaloid which he called "*surinamine*," and which was subsequently also known

as geoffroyine. From the "yellow bark," which he believed to be the produce of *Geoffroya Jamaicensis*, he isolated an alkaloid named "jamaicina," which however was subsequently proved to be identical with *berberine*. Following the directions given by Hüttenschmied, the author was able to prepare surinamine from the true bark, and to confirm the reactions assigned to it. Its composition was found to correspond to the formula $C_{10}H_{13}NO_3$. On further examination it has proved to be identical with methyl-tyrosin, with *angeline* prepared from the resin of *Ferreira spectabilis*, and with *rhatanine*, a substance extracted from a commercial rhatany extract, which in all probability was adulterated with an extract from a species of *Ferreira*. The barks of *Andira inermis* and *A. anthelmintica* also contain this principle, which the author therefore proposes to call *andirine* in preference to the names (surinamine, geoffroyine, rhatanine, and angeline) previously used for it.

Drimys Chilensis. O. Witte. (*Revue internat. de Bib. méd.*, 1892, 984.) The author has obtained from the bark of this plant a volatile oil, belonging to the group of terpenes, also a crystalline substance, apparently a camphor.

Cephalanthus Bark. C. Mohrberg. (*Chem. Centr.*, 1892, ii. 363; *Journ. Chem. Soc.*, February, 1893.) By extracting cephalanthus bark with boiling water and fractionally precipitating the extract with lead acetate in three fractions, there were obtained, in the first, cephalanthin and colouring matters; in the second, a tannin; and in the third, a saponin. But the greater portion of the cephalanthin is contained in the pressed bark, and is obtained by boiling this with lime water, precipitating the lime with carbonic anhydride, and, finally, the cephalanthin with hydrochloric acid. It is very bitter, even in dilution of 1:15,000, very soluble in alcohol, ethyl acetate, ammonia, and soda, slightly in hot and cold water, ether, and chloroform, not at all in benzol and light petroleum. It is a feeble acid of the composition $C_{22}H_{34}O_6$.

When injected, cephalanthin acts as a poison dissolving the blood corpuscles, the colouring matter of which goes into the serum and the urine as oxyhæmoglobin, and is then changed into methæmoglobin. Cramp, vomiting, and paralysis appear, and jaundice, caused by an enormously increased secretion of bile. Among the earlier symptoms are movements of the intestines, but neither the heart, vagus nerve, nor vasomotor system is affected.

The cephalanthus tannin mentioned above is a reddish-yellow

powder, soluble in alcohol and hot water, and gives a green coloration with ferric salts. It is probably a mixture of "true tannic acid" with another substance, the cephaletin of Claassen. The cephalanthus saponin is a poison which dissolves the blood corpuscles; it is, however, not very active.

Laurelia Aromatica. O. Witte. (*Revue internat. de Bib. méd.*, 1892, 984.) The bark of this Chilian tree is found by the author to contain an alkaloid which he proposes to name *laureline*. It is somewhat similar in its reactions to atherospermine and also to boldine. The plants from which these alkaloids have been obtained belong to the order *Monimiaceæ*, and it seems probable that the three alkaloids are closely related.

Assay of Cinchona Barks. J. H. Schmidt. (*Chem. Centr.*, 1892, ii. 946-947. From *Pharm. Centralhalle*, xxxiii. 594-595.) 20 grams of air-dried, finely powdered bark are treated for 24 hours with 10 c.c. of 10 per cent. ammonia, 20 c.c. of 90 per cent. alcohol, and 170 c.c. of ether, with repeated agitation. 100 c.c. of the liquid is then placed in a beaker, 27 c.c. of water and 3-4 c.c. of normal hydrochloric acid added, and the whole set aside for 24 hours to evaporate spontaneously. The residual liquid is then heated on the water-bath to remove alcohol and ammonia, and neutralized with hydrochloric acid. If the liquid is too acid, the excess must be neutralized with cinchonine, not with ammonia or potash. With very rich *Ledgeriana* barks, 1-2 c.c. of acid may be necessary for the complete dissolution of the alkaloids. The supernatant liquid, which amounts to about 15 c.c., is exposed to the air in order to precipitate a red colouring matter, filtered when clear, 2-3 grams of Rochelle salt added, heated for 15 minutes on the water-bath, and then set aside for 24 hours. The precipitated tartrates are then collected and washed by suction, with the smallest possible quantity of water. If all the quinine and cinchonidine are precipitated, the mother liquor will not give any turbidity when warmed with Rochelle salt. An allowance must be made of 0.0008 gram of quinine for each c.c. of mother liquor, and 0.0004 gram for each c.c. of wash water. The tartrates are then dissolved in water containing hydrochloric acid, and repeatedly shaken with ether, until the latter is no longer coloured. The alkaloids are then precipitated with soda, and extracted by repeated agitation with ether; the ethereal extract being evaporated, dried at 100-110°, and weighed. With *Cinchona succirubra* and *C. officinalis*, the residue invariably contains cinchonidine, but this is not the case with rich *Ledgeriana* bark. The residue is

therefore treated with a saturated ethereal solution of cinchonidine, which dissolves the quinine only; the ethereal extract is carefully decanted, the residue washed with a few c.c. of pure ether and again weighed, the loss of weight giving the amount of quinine. From the ethereal solution the quinine can also be readily obtained as a pure tartrate, and its amount estimated either by the polariscope or by De Vrij's method.

The Alleged Value of Bilberry Leaves as a Remedy in Diabetes. F. v. Oefele. (*Pharm. Zeitung*, June 7th, 1893.) The author is of opinion that the reported efficacy of the leaves of the bilberry (*Vaccinium myrtillus*) is based on erroneous observations, the urine in the favourable cases reported upon having been tested merely by means of the polariscope. He points out that the arbutin contained in the leaves renders the urine lævorotatory, thus counteracting the dextro-rotatory action of the glucose. In order to draw sound conclusions, it is necessary, therefore, to examine the urine with Fehling's solution and by the fermentation test. The author thinks that an improvement in the patient's general health may nevertheless take place through the cheering effect produced on his mind by the favourable result obtained by the analyst in the sugar estimation by the optical method.

Coca Leaves. O. Hesse. (*Lisbig's Annalen*, cclxxi. 180-228.) In this paper the author gives a *resumé* of the results obtained by Liebermann, Einhorn, Giesel, himself and others with regard to the constituents and compounds obtained from this drug. For particulars, the reader is referred to the original.

Senecio Kämpferi. Y. Shimoyama. (*Apotheker Zeitung*, vii. 453.) The author has examined the leaves of this Japanese evergreen plant, and has found them to contain an acid crystalline principle of the formula $C_6H_8O_2$, to which the leaves owe their property of imparting a red colour to the skin. A full description of the physical and chemical properties of this constituent are given.

Verbena Urticæfolia. R. M. McFarland. (*Amer. Journ. Pharm.*, August, 1892.) The leaves of this plant have acquired some reputation in domestic practice, as a tonic, and are usually administered in the form of a decoction. The fresh root is also considered to be of some medicinal value, an infusion of it having been administered with advantage in intermittent fevers. This infusion, like the root itself, has a characteristic bitter taste. The author has subjected the dried root to an analysis, and has isolated from it an amorphous glucoside possessing the bitter taste of the drug. This principle

may be obtained by extracting the drug with alcohol, recovering the solvent by distillation, and pouring the residue into acidulated water. After standing a short time the mixture is filtered and the filtrate repeatedly agitated with ether, and subsequently with chloroform, the latter of which extracts the bitter glucoside. The ethereal solution contains, in addition to resin, a crystalline acid principle.

The other constituents of the root were found to be as follows :—

Moisture	10.80 per cent.
Volatile oil, fat, and caoutchouc	0.91 "
Resin	0.55 "
Mucilage	2.40 "
Dextrin	5.28 "
Glucose	5.32 "
Saccharose	4.84 "
Pectin and albuminoids	3.84 "
Starch	1.76 "
Cellulose, lignin, and incrusting matter	40.51 "
Ash	13.82 "

Andromeda Mariana. A. W. Dowd. (*Amer. Journ. Pharm.*, September, 1892, 458.) This shrub, popularly known as "stagger bush," belongs to the natural order *Ericaceæ*, and grows in low, sandy places, throughout New Jersey and southward near the coast. The leaves are said to be poisonous to cattle.

The author's proximate analysis of the leaves shows, in addition to the usual plant constituents, the presence of a sweet glucosidal principle, which is probably identical with the *andromedotoxin* so prevalent in poisonous plants belonging to the same natural order.

Urechites Suberecta. R. Stockman. (*Revue de Clin. et de Thérap.*, 1892, and *Med. Chronicle*, February, 1893.) *Urechites suberecta* is indigenous to Jamaica and other West Indian islands, and belongs to the natural order *Apocynaceæ*. The leaves contain two bitter poisonous glucosides, *urechitin* and *urechitoxin*, which have been examined by the author with regard to their physiological action. The former (*urechitin*) causes vomiting, muscular weakness, and reduction of the heart's action. *Urechitoxin* produces similar effects, but is less poisonous. Both are heart poisons, similar in their action to digitalin, and possessing in a very high degree the disadvantage of producing cumulative effects. So much is this the case, that it is considered improbable that *Urechites suberecta* will ever prove of much value as a cardiac tonic.

Genipa Brasiliensis. W. Kwasnik. (*Chem. Zeit.*, xvi. 109-110.)

The crushed fresh leaves of this plant were repeatedly extracted with strong alcohol at 60° C., and the united extracts filtered and distilled. The residue was extracted with hot water, the filtered solution treated with lead acetate, and subsequently with basic lead acetate, the excess of lead removed from the ultimate filtrate with sulphuretted hydrogen, and the clear liquid evaporated to the consistence of a syrup. A crystalline constituent was thus obtained which, on examination, proved to be identical with mannite.

Pernambuco Jaborandi. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xxiii. 1003.) This drug is the produce of *Pilocarpus Jaborandi*, a species distinct from *P. pennatifolius*. The most marked features in this species are :—(1) the deciduous pinkish-yellow flowers with slender pink pedicels; (2) the less quadrate, larger, and more convex carpels, as compared with those of *P. pennatifolius*; (3) the more leathery leaflets, with elliptic outline, unequal base, and prominent veinlets on the upper surface, the leaflets being normally in four pairs.

As the leaves of *P. Jaborandi* are known to yield more alkaloid than the Paraguay plant, the former only should be official. For pharmaceutical purposes the leaves are described as follows :—

Leaves coriaceous, elliptical, entire, emarginate, somewhat rigid, 10–15 cm. long by 2½–5 broad, tapering equally towards either end, oblique at the base, with the veinlets on the upper surface distinctly prominent.

Paico. (*Répertoire de Pharm.*, March, 1893, 120.) The name paico applies to a Chilian drug consisting of the flowering tops of *Ambrina ambrosioides* and *A. chilensis*. It is administered in doses of one tablespoonful of an elixir prepared by mixing an alcoholic percolate with simple syrup, and is stated to be valuable in chronic catarrh of the stomach. Its therapeutic properties are attributed to an aromatic essential oil contained in it.

Proportion of Ash in Marjoram Leaves. G. Rupp. (*Pharm. Zeitung*, February 18th, 1893.) The author finds the average proportion of ash in the German marjoram herb to be 14·5, including 2·5 per cent. of sand, and that in the French drug 16·5 per cent., including 3·5 per cent. of sand. The ash of the German herb is generally richer in manganese than that of the French, and to this it owes its greenish colour.

Composition of the Tobacco Plant. R. J. Davidson. (*Virg. Stat. Bul.*, 1892, No. 14.) The author has estimated the average proportions of moisture, nitrogen, and ash constituents in the air-dried leaves, stems, and roots of four varieties of tobacco, and

finds that about one-third of the fertilizing constituents are contained in the roots and stems, which should therefore be returned to the soil.

Constituents of Arnica Montana. B. Börner. (*Pharm. Centralhalle*, 1892, 688.) The most important constituent of arnica flowers is *arnicin*, $C_{12}H_{22}O_2$, which occurs in them to the extent of 4 per cent. It forms minute yellow or reddish-yellow, somewhat deliquescent crystals, soluble in alcohol, ether, acetone and benzol, insoluble in water and alkalies, fusing at 40° , and boiling at 83° C. In addition to this the flowers contain malic acid, dextrose, and fatty matters composed of the glycerides of lauric and palmitic acids, with a small quantity of a hydrocarbon of the marsh gas series, crystallizable from acetone in pearly scales and fusing at 60° C.

Constituents of Insect Powder. F. Schlagdenhauffen and E. Reeb. (*Pharm. Zeitung*, 1892, 374.) In continuing their investigations, the authors obtained, by distilling Dalmatian insect powder with steam, a pale yellow oil of a chamomile-like odour, in which was suspended a small quantity of a crystalline substance. The aqueous distillate contained formic, acetic, and propionic acids, and another organic acid, which was found to be poisonous, called *chrysanthemic acid*; the sodium salt of this acid was insoluble in alcohol. The residue from the distillation was found to still have toxic properties; by extracting this residue with petroleum ether, evaporating, dissolving in alcohol, neutralizing with potash, evaporating to dryness, taking up with water, filtering, acidifying the filtrate with tartaric acid, extracting with ether, and evaporating the ethereal solution, another poisonous acid, *pyrethrotoxic acid*, was obtained as a yellow, uncrystallizable, soft mass, which proved to be very soluble in alcohol, chloroform, petroleum ether, benzol, acetic ether, and acetone. Caucasian insect powder yielded almost identical results.

The Toxicity of the Yew. F. J. M. Stuart Wortley. (*Pharm. Journ.*, 3rd series, xxiii. 183.) The author expresses the belief that the actual poisonous principle of the yew has not yet been definitely determined. He also describes some experiments undertaken with a view to testing the theory that the male plant is poisonous, whilst the female yew is harmless, to cattle. Air-dried and powdered leaves from each were treated with ether to remove chlorophyll, wax, etc., and an alcoholic extract was prepared from the residue. This extract was subsequently macerated with water, and the filtered aqueous solution used in the experi-

ments. It was found that taxine is contained chiefly, or entirely, in the male yew.

Vaccinium Vitis-Idæa. Dr. Smirnoff. (*Bull. de Thérap.*, 1892, 470.) The author confirms the value of the cowberry plant in the treatment of chronic rheumatism. He has employed it in the form of a decoction of the whole plant made in the proportion of 30 to 60 grams to 500 c.c. of water.

Gymnocladus Canadensis. J. H. Martin. (*Amer. Journ. Pharm.*, November, 1892.) This tree is known in Canada and the Northern States as *chicot* or *stump tree*, and in Pennsylvania and southward as the *Kentucky coffee bean* and *Kentucky magnolia*. It reaches the height of 50 to 100 feet. The bark of the trunk is thick and scaly, and the outer portion can be easily removed. The wood is dense, of a rose colour, and admits of a high polish; it is therefore used extensively for furniture. The leaves when green are steeped in water and used as a fly poison. The pods, when preserved like those of tamarind, are said to have a slight aperient effect. The roasted beans are used as a substitute for coffee. The immature beans, however, are stated to possess toxic properties, paralyzing the centre of respiration, lowering the blood pressure, and increasing the nerve sensibility. On submitting various parts of the tree to proximate analysis, no indications of the presence of an alkaloid could be obtained. The physiological activity of the plant seems to be due to saponin, which was found in all the parts examined.

Anagallis Arvensis. G. Daccomo and D. Tommasi. (*Revue de Thérap.*, lix. 470.) The authors find that this plant contains a ferment analogous in its action to pepsin and pancreatin. It is without action upon starch, and can be isolated from the plant in the form of a white amorphous substance soluble in water. The authors attribute to this ferment the property of the plant of destroying fleshy growths and even horny warts by local applications.

Epiphegus Virginiana. A. C. Koeppen. (*Amer. Journ. Pharm.*, June, 1893.) This American plant, commonly called "beech drop," is parasitic on the roots of the beech tree. Its medical properties are regarded as astringent and depurative. The author's chemical examination of it shows the presence of a glucoside, an alkaloid, and a crystalline organic acid, together with tannin, resin, mucilage, sugars, and fat.

Solidago Rugosa. W. P. Oberhauser. (*Amer. Journ. Pharm.*, March, 1893.) A quantity of the plant was collected during the

flowering season, and after careful drying submitted to analysis, with the following results :—

	Per cent.
Volatile oil	0.996
Fixed oil	2.210
Wax	0.906
Caoutchouc	1.330
Chlorophyll and resin	4.244
Mucilage	1.900
Dextrin	10.200
Sugar	0.666
Pectin	0.640
Calcium oxalate	0.135
Inulin	0.690
Pararabin	1.000
Lignin	4.690
Incrusting matter	8.580
Cellulin	8.230
Undetermined extractive	9.895
Tannin	2.700
Moisture	9.710
Ash	19.050
Loss	11.958

A search for glucosides and alkaloids gave negative results.

The volatile oil distilled from the flowers was colourless, and had a specific gravity of 0.8486 at 15° C.; that from the leaves was straw-coloured, and had a specific gravity of 0.8502. Both boiled at 130° C., and contained a large proportion of terpene. The odour was similar to that of oil of organum.

Aplopappus Clareta. (*Lancet*, 1241.) This Chilean plant is very favourably reported upon as a remedy for gonorrhœa and gleet. It is administered in the form of an extract, which is dissolved in twenty to forty times its weight of water, and the solution given in doses of one to two tablespoonfuls.

Jurubeba. *Solanum Paniculatum*. D. Freire. (*Chem. and Drugg.*, May 27th, 1893.) This South American drug has been examined by the author, who isolated from it an alkaloid and two resinoid principles. The alkaloid—jurubebine—when injected in very minute quantities into a small bird, produces marked tetanic convulsions, ending in death. Of the resinoid substances, jupebine has an extremely purgative action, such as that of podophyllin, which it closely resembles. The second, jupebin, is non-active. The author finds that the poisonous alkaloid occurs chiefly in the leaves.

Adonis Vernalis. E. Merck. (*Jahresbericht* for 1892.) The

author has isolated from this plant a crystalline constituent of the formula $C_5H_{12}O_6$, for which he suggests the name adonite. According to experiments carried out by R. Kobert, it does not seem to possess any marked physiological properties. It fuses at $102^\circ C.$, has a slightly sweet taste, is very soluble in water, and optically inactive.

Sophora Secundiflora. (*Pharm. Journ.* From *Kew Bulletin*, lxi. 216.) The *Sophora secundiflora* (nat. ord. *Leguminosæ*) is a small tree or shrub of Matagorda Bay, Texas, and forms dense thickets on the borders of streams. Its wood is heavy, hard, close-grained, and of an orange colour streaked with red. The leaves and seeds are said to produce tetanus in animals eating them, and a whole pod to be sufficient to kill a man. The seeds, which are stated to contain an exceedingly poisonous alkaloid, sophorine, are used by Indians in the neighbourhood of San Antonio to produce intoxication, half a seed producing exhilaration, which is followed by sleep lasting two or three days.

Mosula Japonica. Y. Shimoyama and H. Ono. (*Apotheker Zeitung*, vii. 439-440.) *Mosula japonica* is a Japanese plant belonging to the order *Labiata*. It has a characteristic thymol-like odour, due to the presence of an essential oil, of which it yields 2.13 per cent. The authors have examined this oil, and find it to have a specific gravity of 0.820 at $17.5^\circ C.$, to be laevorotatory, and to contain 44 per cent. of thymol.

Medicinal Plants of Brazil. T. Peckolt. (*Pharm. Rundschau. Pharm. Journ.*, 3rd series, xxiii. 429-430.) The following plants are discussed in this paper:—

Amaryllidaceæ, *Alstræmeria caryophyllata*, *A. Cunha*, *A. monticola*, *Bomarea salicilloides*, *B. spectabilis*, *Fourcroya Cubensis*, *F. gigantea*.

Iridaceæ, *Alophia Selluviana*, *Cipura paludosa*, *Cypella cœrulea*, *C. Northiana*, *Lansbergia cathartica*, *L. juncifolia*, *L. purgans*, *L. Caracasana*, *Polia Bonariensis*, *Sisyrinchium galaxoides*.

Xyridaceæ, *Abolboda Brasiliensis*, *A. Poarchon*.

For particulars, reference should be made to the original paper.

Agave Americana. G. Michaud and J. F. Tristan. (*Amer. Chem. Journ.*, xiv. 548-550.) This plant is extensively grown in Mexico for the sake of the juice of the stalk, from which a fermented intoxicating drink called *pulque* is made. The authors have isolated the saccharine constituent of this plant, which they describe under the name "*agavose*," and find to have a composition represented by the formula $C_{12}H_{22}O_{11}$. It is optically inactive,

reduces Fehling's solution, and yields a lævogyre sugar on inversion.

Morrenia Brachystephana. MM. Del Arca and Sicardi. (*Semaine Méd.*, July, 1892.) This plant grows in the Argentine Republic, where it is known as *tasi*, and belongs to the order *Asclepiadaceæ*. It is reported to be an excellent galactagogue, the root, leaves, and fruit being employed in the form of an infusion or decoction.

Galactagogue Remedies. Miss Griniewitch. (*Bull. gén. de Thérap.*, August 30th, 1892.) The authoress' investigation leads to the conclusion that the herb of *Galega officinalis* (goat's rue), the nettle, cumin, anise, and fennel are reliable galactagogues, their activity being in the order named. No undesirable effect was observed from these remedies, either upon the women while taking the medicine, nor the children whom they nursed. The milk was normal in density, a slight increase of fat being noticed. The herbs may be given in the form of extract, while anise and the other fruits may be taken in powder in doses of 1 gram, from twice to five times a day.

Some Medicinal Products from the Straits Settlements. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xxiii. 388-390.) *Ipo*.—Under this name, which signifies poison, various compounds are employed for poisoning arrows in different provinces of the Straits Settlements. In Perak there are two tribes of aborigines who use arrow-poison; viz., the Semangs in the north, and the Sakais in the south. The Semangs and the Sakais, living in the plains, employ the poisonous milky juice of *Antiaris toxicaria*, which they call *ipoh kayu* (i.e., tree poison). The Sakais of the hills use a poison prepared from three hill plants known as *ipoh aker* (i.e., root poison), *prual*, and *aker lampong*. An interesting account of the mode of preparation of these poisons was published by L. Wray in the *Kew Bulletin* for November, 1891, and will be found reprinted in the present paper.

An examination of herbarium specimens of the *ipoh aker* and *aker lampong* has satisfied the author that they both belong to the genus *Strychnos*, and probably constitute two distinct species. As to the *prual*, the material under investigation was not sufficient to determine its botanical source, but it seems certain that it is not a *Strychnos*. The two species of *Strychnos* referred to have been examined with regard to their physiological properties by R. Stockman, who finds that they resemble digitalis in their action on the heart, and do not produce the characteristic effects of

Strychnos Nux-vomica. The author calls attention to this observation as a point of special interest, since no species of Oriental *Strychnos* has hitherto been shown to differ essentially in action from *nux-vomica*. An account of Dr. Stockman's physiological experiments will be found in *Pharm. Journ.*, May 20th, 1893, 945-946.

Minyak Plang.—This product may be called plang oil, the Malay word minyak signifying oil. It is a dark-brown viscid liquid, exuding from incisions in the lower part of the trunk of a tree which is more than one hundred feet in height. An examination of the herbarium specimen sent by L. Wray leads to the conclusion that the tree belongs to the *Anacardiaceæ*, and that it is a new species and possibly even a new genus; but in the absence of specimens of the ripe fruit, no definite opinion could be arrived at. The oil is in great repute among the natives as a cure for skin diseases, particularly psoriasis, pityriasis, and ichthyosis, which are known by the Malayan name of "kurap." It is of the consistence of liquid storax, and has comparatively little odour. It mixes readily with rectified spirit of wine, forming a dark-brown solution. Rubbed on the skin in its pure state it produces a greasy, but not a sticky sensation.

Milor.—Under this name a whitish bark with an odour of coumarin, and a herbarium specimen of the plant in flower, have been received. According to L. Wray, it is a climbing plant which grows on the hills, and is apparently one of the *Apocynaceæ*. The bark and leaves have a sweet scent, and are employed by the natives as a perfume. The flowers are white. The author considers the plant to be an unnamed variety of *Alyxia stellata*, and the fragrance of the bark to be due to coumarin.

Itah Tembaga.—The root of this plant is employed as an aphrodisiac by the Malays. The plant yielding it has been identified as *Smilax calophylla*.

Itah Viti.—The root of this plant is used for the same purpose as the *Itah tembaga*, but is said to be more efficacious. It is the produce of *Smilax myosotiflora*.

Aker Sindarah.—The root, as implied by the name *aker*, is the part employed in medicine by the Malays and aborigines. It is used in the form of an infusion to produce abortion. The plant belongs to the natural order *Anonaceæ*, and corresponds with *Goniothalamus macrophyllus*.

Buah Slisis.—The herbarium specimen of this plant sent by L. Wray proves to be *Ocimum basilicum*. The seed, which is the part

used, is employed in the treatment of dysentery and diarrhoea. It has the property of forming a mucilage with a large quantity of water.

Biah.—This drug consists of leaves said to be used as a substitute for opium. They are supposed to be derived from a Rubiaceous plant of the genus *Nauclea*.

Sintoh.—This is the prepared stem of a climber, which is used as a substitute for soap. The drug consists of a dark-brown fibrous mass, closely resembling the preparation used for a similar purpose in the Philippine Islands, which is obtained from the roots and stems of *Entada scandens* (*Leguminosæ*).

Kulit Lawang (i.e., *kulit*, bark; *lawang*, clove).—This name is usually applied to barks having an odour or flavour of cloves. The specimen examined had, however, a flavour of sassafras rather than cloves. The name *Kulit-lawang* appears to be loosely employed in the East Indies to describe various barks of trees derived from the genus *Cinnamomum*. The herbarium specimen received with the bark had neither flowers nor fruit, but, so far as could be determined from the leaves alone, it probably belonged to *Cinnamomum vimeum*.

Sideroxylon Sp.—The herbarium specimens received under this name were apparently derived from *Sideroxylon Malaccense*, natural order *Sapotaceæ*. The wood of this tree is exported into Bombay, and used to give a flavour resembling that of rum to spirits and liqueurs. The plant is said to yield an inferior gutta.

Pambotano. (*Merck's Bulletin*, 1892, 253.) The Mexican remedy known as pambotano is stated by H. Baillon to be obtained from *Calliandra Houstoni*, belonging to the *Mimosæ*. It is a powerful astringent, owing its properties to the presence of a peculiar tannin which shares with the tannin of *Calliandra grandiflora* the characteristic feature of turning red on exposure to the air.

The Active Constituents of *Grindelia Robusta*. A. Schneegans. (*Pharm. Journ.*, 3rd series, xxiii. 72.) The contradictory statements that have been published concerning the active principles of *Grindelia robusta* have led the author to re-investigate this plant. Rademacker, in 1876, found in *Grindelia* an alkaline body, which he obtained in a crystalline form, also a crystalline acid capable of forming salts with bases. In 1888, Libby obtained from the same plant several resins, one of which had an acid reaction. In the same year, W. H. Clark treated both *G. robusta* and *G. squarrosa* according to Dragendorff's method for plant

analysis, and obtained a body reacting like a glucoside, and which appeared to be of the nature of a saponin, but did not give the characteristic red colour of saponin with concentrated sulphuric acid. This body had a weak acid reaction. Another substance was also found by him, giving a reaction for alkalies with ordinary alkaloidal precipitants, but which could not be isolated, treatment with alkali and extraction with ether yielding only a neutral body not giving a precipitate with alkaloidal reagents. J. L. Fischer, in 1888, obtained an alkaloidal substance and prepared its sulphate in a crystalline form. The author obtained a saponin consisting of two glucosides, one precipitated by the acetate and the other by subacetate of lead, both of which differ from the saponins of *Quillaia* bark and *Senega* in having a slight acid reaction. The reaction in the glucoside precipitate by acetate of lead is very weak, and may be due to contamination with the glucoside precipitated by the subacetate of lead. The author also detected the presence of an alkaloid, but in very small quantity.

Paris Quadrifolia. H. Baillon. (*Pharm. Journ.* From *Merck's Bulletin*, 1892, 312.) The author states that the botanical, physiological, and chemical study of the Parisette (*Paris quadrifolia*) has of late been again taken up. The plant has been shown to contain a glucoside called *Paridine* ($C_{32}H_{56}O_{14}$), decomposable by alcohol and hot hydrochloric acid into *Paridol* and glucose. Another glucoside, *Paristypine* ($C_{38}H_{64}O_{18}$), has been discovered by Walz. F. Heim, who is now conducting a research on the subject, considers that extracts of the plant contain one or more alkaloids, as well as glucosides, and A. Gautier has described a method for extracting both at once. As a medicine, Parisette acts on the respiratory centres, and also affects the muscles in a similar manner to curare. Its action on the pupil resembles that of the Calabar bean in being antagonistic to belladonna. C. Richet compares its properties with those of aconite, for which it may sometimes serve as a substitute. The leaves are the least active parts of the plant, whilst the seed possesses no activity. The rhizome is more active in autumn than at other times. The fruit also is then fully matured and best fit for use.

Constituents of Chimaphilla Umbellata (C. Maculata). J. C. Peacock. (*Amer. Journ. Pharm.*, 1892, 295.) *Chimaphilin*, which can be obtained from all parts of this plant, crystallizes in yellow needles fusing at 113–114° C., and having a composition corresponding to the formula $C_{24}H_{21}O_4$. On heating beyond the

melting-point they sublime without undergoing any decomposition. They are soluble in alcohol, chloroform, ether, benzol, petroleum ether, and acetic acid. They have but little taste, but produce a tingling sensation on the tongue and fauces. The author finds that, in addition to chimaphilin, this plant contains three other crystalline constituents differing in their physical and chemical properties from all hitherto known constituents of members of the *Ericaceæ*.

Basic Constituents of *Vicia Sativa*. E. Schulze. (*Zeitschr. für physiol. Chem.*, xvii. 193-216.) The seedlings of this plant were found to contain the following nitrogenous bases:—Asparagine, glutamine, leucine, phenylalanine, traces of tyrosine, besides guanidine, choline, and betaine. The ungerminated seeds also contain viscine, but this disappears during the progress of germination.

Plants capable of yielding Tanning Materials. F. E. Mafat. (Abstract of a prize essay in *Journ. Soc. Chem. Ind.*, July, 1892.) *Algarobilla*.—The pods of different species of *Prosopis*, containing 60-65 per cent. of tannin; imported from South America, particularly Chili.—*Leguminosæ*.

Alder (*Betula Alnus*).—In Europe *Alnus glutinosa* and *Alnus firma*, and in Japan *Alnus firma*, are indigenous. The bark, leaves, and fruit contain 13 to 15 per cent. of tannin; the 36 per cent. given by some authorities may be doubted. The Japanese alder contains 25 per cent. of tannin, and colours the leather but little; the European alder is used in Russia, and gives a deep colour.—*Betulaceæ*.

"Arbousier" (*Arbutus Unedo*) grows in Europe; its leaves are used for tanning in Asia Minor, and contain as much as 36·4 per cent. of tannin.—*Ericaceæ*.

"Airelle-myrtille" (*Vaccinium Myrtillus*).—This plant, more commonly known as bilberry, is abundant in France, Germany, and England. Its tannin is rapid in its action, and 3·5 kilos. of the dried and ground plant will make 1 kilo. of sole leather in a short time. The plant is best pruned like sumac, the leaves are not affected by moisture when gathered, which cannot be said of oak bark.—*Ericaceæ*.

Alcornoque (*Bowdichia virgilioides*) is South American; the root, wood, bark, and leaves contain tannin.—*Leguminosæ*.

Acacia.—Various species of acacia yield the fruit or pods known as balibabalah, cassia grains ("grain de cassier"), bablah, nebb, and Indian pods ("gousses de l'Inde"). Bablahs were first

imported into Europe in 1830 as a mordant; the percentage of tannin in them is from 25–32, according to species. The exporting countries are India, Egypt, Nubia, Syria, Arabia, Senegal, and Mauritius. Acacia extract contains a strong free acid, a tannin analogous to that of nut galls, and a large quantity of a calcium salt.—*Leguminosæ*.

Andromeda.—Several species grow in Lapland and North America, where they are known as “sour-tree.” The wood contains 4–8 per cent. and the leaves 10 per cent. of tannin.—*Ericaceæ*.

Birch contains a tannin in wood, bark, and leaves, which colours iron salts green. Davy gives 1.675 per cent. as the tannin contents; Villon, 3 per cent.; Fraas, 5.32 per cent.—*Betulaceæ*.

Bennet (*Geum urbanum*) is wild in Central and Southern Europe; its roots, leaves, and flowers are astringent, and according to Tromsdorff contain 42 per cent. of tannin free from gallic acid; others, however, give 4 per cent. in the whole plant.—*Rosaceæ*.

Bistort (*Polygonum Bistorta*) contains in its roots, stem, flowers, and leaves “bistortannic acid” and a yellow colouring matter assimilable by hides; it haunts the marshy land of Southern France.—*Polygonaceæ*.

“*Behen rouge*” (*Statice latifolia*) grows in Persia, the Caucasus, etc. Its roots are used in Southern Russia as tan for skins, to which it imparts a dull, ochreous, red colour.—*Plumbaginaceæ*.

“*Bois doux*” (*Inga vera*, etc.) is a tree of Mexico, Guadeloupe, and the Indies, where it is known as coorocoopully; its wood and bark are tanniferous.—*Leguminosæ*.

Bauhinia (*Bauhinia variegata*) grows in the Antilles and Central America; its wood and bark contain tannin.—*Leguminosæ*.

Bearberry (*Arbutus Uva-ursi*) grows in France, Italy, Spain, and Russia, and contains 14 per cent. of tannin in its leaves according to some authorities, and 36.4 per cent. according to others.—*Ericaceæ*.

Oak (*Quercus*).—There are seventy to eighty species of oak, comprising two hundred and seventy-five varieties, about half of which inhabit the old and half the new world. The hard oak dominates in Europe, and of its two varieties, *Quercus pedunculata* and *Quercus sessiliflora*, the latter has the bark which is richer in quercitannic acid. Of other oaks the following are given:—*Q. Tauza*, 8 per cent. of tannin in its bark; *Q. Cerris* (hairy-cupped oak), 10 per cent. of tannin in bark; *Q. Ilex* (ever-

green oak), 10 per cent. of tannin in bark; *Q. Suber* (cork oak), 10 per cent. of tannin in bark; *Q. Ballota*, 10 per cent. of tannin in bark; *Q. mirbeki*, 12 per cent. of tannin in bark; *Q. coccifera* (kermes oak), 15 per cent. of tannin in bark; *Q. Ægilops* (valonia), 8 per cent. of tannin in bark; *Q. infectoria*; *Q. glomerata* (Russian oak). The above are African and European. Of American oaks may be mentioned:—*Q. alba* (white oak), 7·85 per cent. of tannin in bark; *Q. tinctoria* (black oak), 6·47 per cent. of tannin in bark; *Q. rubra* (red oak), 5·55 per cent. of tannin in bark; *Q. coccinea* (scarlet oak), 7·78 per cent. of tannin in bark. It may be generally stated that oak bark contains from 7–18 per cent. of quercitannic acid, while the wood and leaves contain 5–7 per cent.—*Cupuliferæ*.

Chestnut (*Castanea vesca*), abundant in Southern Europe and North America; the wood contains 68 per cent. of water when felled, 43 per cent. three months after felling, the bark being left on, and 35 per cent. five months after sawing and stripping. The wood and bark contain 4–12 per cent. of tannin (castanea tannic acid).—*Cupuliferæ*.

Cornelian Cherry (*Cornus mascula*, dogwood) grows in Europe, especially France; its bark, leaves, and fruit contain 19·9 per cent. of tannin according to Gassinourt, and 8–9 per cent. in the bark according to some other analysts.—*Cornaceæ*.

Carob (*Ceratonia Siliqua*) grows in Spain, Italy, France, Algiers, and Egypt. Its fruit (St. John's bread) contains 50–55 per cent. of tannin.—*Leguminosæ*.

Carob of Judea (*Pistacia Terebinthus*) grows in the Levant, and gives rise to horn-shaped galls which contain 25 per cent. of tannin, and are called "caroubes."—*Anacardiaceæ*.

Conocarpus arborea and *C. racemosa*. West Indies and Brazil; its bark and fruit contain tannin. Its indigenous name is "mangle."—*Combretaceæ*.

Catechu.—The brownish-red catechu of Bengal is the exudation from the *Acacia Catechu* (*Leguminosæ*). The Bombay brown catechu is from the *Areca Catechu* (*Palmeæ*)—the areca palm. Gambier is the extract from the leaves of *Uncaria Gambier* (*Rubiaceæ*). To Bengal catechu have been ascribed of tannin 54·5 per cent. (Davy), 38·2 per cent. (Renard), and 48 per cent. (Villon). To Bombay catechu, 48·5 per cent. (Davy), 54·5 per cent. (Renard), and 55 per cent. (Villon). To Gambier, 58 per cent. (Davy), 38–40 per cent. (Renard), and 65–79 per cent.

(Villon). Catechuitannic acid (mimotannic acid) colours iron salts green.

Canaigre (*Rumex hymenosepalum*) grows wild in the marshy lands of the south-east of the United States; its bulbs contain 20–24 per cent. of tannin. Most other varieties of rumex also contain tannin.—*Polygonaceæ*.

Paraguay acacia (*Curupay*) of South America contains 16–20 per cent. of “curupatannic acid.”—*Leguminosæ*.

Divi-divi (*Caesalpinia Coriaria*), chiefly from Mexico and Venezuela, contains ellagitannic acid to the extent of 30–45 per cent.; it imparts a reddish-brown colour to leather.—*Leguminosæ*.

Eucalyptus (*Eucalyptus resinifera*) is used in New Caledonia, where it grows, as a tanning agent; the tannin in its leaves is estimated at 10–12 per cent.—*Leguminosæ*.

Fustic, young (*Rhus cotinus*), grows in Southern Europe, and contains a tannin which colours iron salts olive green.—*Terebinthaceæ*.

Spiræa (*S. Filipendula*) has astringent flowers and roots.—*Rosaceæ*.

Strawberry (*Fragaria vesca*).—The flowers and roots are astringent.—*Rosaceæ*.

Pomegranate (*Punica Granatum*).—The bark of this tree was used by the ancients as a tanning agent under the name “malicorium.” Davy attributes 18·8 per cent. of tannin to it. The shell of the fruit contains 22–25 per cent. of tannin, and is used for tanning in Japan. The wild pomegranate contains 46 per cent. of tannin.—*Granatææ*.

“*Gonakié*” (*Acacia Adansonii*), or red gum, yields very tanniferous fruit, which is used as a tannage in West Africa.—*Leguminosæ*.

Kino is the dried exudation or extract of several plants, of which the principal are:—*Dipterocarpus erinaceus* (Africa), *Butea frondosa* and *B. superba* (N. India), *Pterocarpus Marsupium* (India), *Coccoloba uvifera* (Jamaica), and *Rhizophora Mangle* or mangrove (Mexico), whose leaves contain 18–20 per cent. of tannin; the first four are of the *Leguminosæ*. Kino contains 45–55 per cent. of “coccotannic acid.”

Mastic (*Pistacia Lentiscus*).—The leaves and bark contain 10–12 per cent. of tannin; used for tanning buffalo skins in certain countries.—*Terebinthaceæ*.

Mimosa.—The *Mimosæ* include a great many varieties of acacia; the most valuable bark is from Tasmania; the Australian produce

contains 25 per cent. of tannin (*A. cyanophylla*)—45 per cent. (*A. pycnantha*); *A. sentis* (6.32 per cent.) and *A. binervata* (30.40 per cent.) are from New South Wales.

Myrobalans, the fruits of several species of *Terminalia* (*Combretaceæ*); their contents of tannin are variously given, 18.2 per cent. and 52 per cent. being the extremes. Loewe asserts the invariable presence of ellagic acid ($C_{14}H_{10}O_{10}$).

Galls are classified as European and Asiatic; of the latter there are Levant galls and Aleppo galls. The Levant galls contain 77.42 per cent. of gallotannic acid (Müller); the Aleppo galls contain 60–66 per cent. (Fehling). Villon gives the following for Aleppo and Levant galls:—Black, 37–41 per cent.; green, 53–60 per cent.; white, 50–65 per cent. For Smyrna galls he gives:—Black, 33–37 per cent.; green, 53–60 per cent.; white, 60–63 per cent. Renard gives 33–60 per cent. as a mean of all three kinds. Mierzinsky gives 60–66 per cent. as a mean. Of European galls those of Morea and Istria are the best, and have some 40 per cent. of gallotannic acid; Italian and Hungarian galls follow, and those of Germany and France are least important. French galls contain 9–10 per cent. of tannin; German galls, according to Villon, contain 18–19 per cent. of soluble and 13–14 per cent. of insoluble tannin. Chinese and Japanese galls are from plants belonging to the *Terebinthaceæ*; viz., *Rhus semialata* in China and *Distilium racemosum* in Japan; 69 per cent. is the mean of the many versions which have been given of the tannin in Chinese galls. Hungarian galls, or “knoppeln,” are from oaks, and contain 20–35 per cent. of tannin. Bassorah galls are from an oak, and contain 57 per cent. of gallotannic acid according to Kathreiner, Eitner, and others. Renard gives 27 per cent. and Villon 30 per cent., of which 3 per cent. are difficultly soluble. Bokhara galls are from the Indian tamarisk (*Terebinthaceæ*); their percentage of tannin has been variously given from 26 per cent. to 50 per cent.

Osier (*Salix viminalis*) contains 7–10 per cent. of tannin in its bark, which is largely used in Northern Russia.—*Salicaceæ*.

Quebracho comes from nearly all the eastern states of South America (source of aspidospermene); red quebracho (*Loxopterygium Lorentzii*) contains 16–22 per cent. of “aspidospermanic acid,” while white quebracho (*Aspidosperma Quebracho*) only contains 10–11 per cent. At the Paris Exhibition of 1867, leather tanned with quebracho was shown for the first time in Europe, and in 1874–75 the utility of this wood became recognised in

France. In whatever form quebracho wood is to be used, exposure to air should be avoided as much as possible. A sample which indicated 20 per cent. of tannin when freshly cut was found to contain only 16 per cent. after six months' storage.

Red rhatany (*Krameria triandra*.—*Polygalaceæ*) grows in Argentina, Brazil, Chili, and Alsace; its bark contains "rhataniataunic acid." The dried extract is with difficulty distinguished from kino; the bark, however, contains 42·5 per cent. of tannin, while kino averages 50 per cent.

Pine.—The bark of *Pinus Picea* contains 6–7 per cent. of tannic acid. *Pinus canadensis* is the balmock (white spruce) so much used for tanning in the United States; the bark contains 8–10 per cent. of tannin. The bark of *Pinus abies* contains 7–8 per cent. of tannin. Villon found 25 per cent. of tannin in the inner bark of *Pinus Aleppensis*, 3 or 4 per cent. in the outer bark, and 7 per cent. in the cones.

Larch (*Larix Europæa*) bark contains 1·66 per cent. of tannin according to Davy, and 5·8 per cent. in springtime according to Müller. There is no tannin in the wood of any of the *Coniferae*.

Sumac is from several species of *rhus*, of which *Rhus coriaria* is the chief. The percentage of tannin in various sumacs is from 10–28·2 per cent.

Tormentilla reptans and *T. erecta* (*Rosaceæ*), wild in the Alps and Pyrenees, are employed as tannage in the Faroe Islands, where they produce a red leather. They contain tannin in the flowers and roots to the extent of 31 per cent. according to Renard ("tormentillo-tannic acid"), and of 17 per cent. according to others.

Willow.—The various species of *salix* (*Salicaceæ*) contain tannin in the bark and leaves; in the former it varies greatly, 1·4 per cent. and 16 per cent. having been found in different instances. Willow bark has long been used by tanners in Russia.

Mountain ash (*Pyrus aucuparia*, *Rosaceæ*) contains 5–7 per cent. of tannin in its bark, 3·5 per cent. in its wood, and some also in its leaves and fruit.

Valonia, *Quercus Ægilops* (*Cupuliferae*).—These well-known acorn-cups contain from 25 to 45 per cent. of tannin. The main varieties are—*Chamada*, 33·4 per cent.; *Chamadina*, 35·4 per cent. and upwards; *Rabdiata*, 30 per cent.; and *Chondra*, 27 per cent. Powdered valonia is poorer in tannin than the cups, because, before grinding, the bark and wood chips are not completely separated.

Seaweeds. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xxiii. 735-739.) The author gives an interesting sketch of the present state of knowledge respecting seaweeds applied to medicine, and seaweeds used as food, and concludes by suggesting the following as points worthy of investigation in connection with marine algæ.

The presence of starch or gelatinous matter in some of the commoner British species, e.g., *Gracilaria confervoides*, *Almofeltia plicatu*, etc.; the value as manure of different species (e.g., it has been found that *Halopithys pinastroides*, which contains very little iodine, yields about 12 per cent. of potash); the nature of the pungent odours given off by certain algæ (e.g., *Monospora pedicellata*, *Griffithsia corallina*, *Spondylothamnion multifidum*, and *Dictyopteris polypodioides*); the cause of the rapid decay when removed from sea water of various *Desmaresticæ*, and of the nature of the decomposition which they cause in other algæ by contact, and the pungent principle (evident to the taste) of *Laurencia pinnatifida*. From a physiological point of view the galls formed on *Cystacloium*, *Chondrus*, and *Delesseriæ*, etc., and attributed by F. Schmitz to the presence of bacteria; the vital and chemical process by which granular sulphur is deposited in the filaments of *Beggiatoa*, and the influence of currents and temperatures and local peculiarities on the distribution of species. For those inclined to the pursuit of systematic botany, the author mentions that the comparison of the British marine flora with that of neighbouring countries has led to the discovery of nearly two hundred species previously unknown as British, and that fresh species are still being added by a widening circle of algologists nearly every month. He considers it as almost certain that the exploration of the Orkney, Shetland, and Scilly Isles would add a considerable number. He also points out that the reproductive organs of several species are still unknown.

Mucilaginous Seeds. J. R. Jackson. (*Chemist and Druggist*, January 28th, 1893.) The seeds noticed in this paper are those of *Plantago Ispaghul* (*P. ovata*), *Salvia hispanica*, and *Phyllanthus maderaspatensis*. The original should be consulted for particulars.

Owala Seeds. E. Heckel and F. Schlagdenhauffen. (*Répertoire de Pharm.* [3], iv. 337.) Owala seeds are derived from *Pentaclethra macrophylla*, a West African plant belonging to the *Leguminosæ*, and are used by the natives as an article of food. They are found to contain 45 per cent. of fatty matter, upwards of 30 per cent. of proteids, and about 5 per cent. of sugar and tannin. The fatty constituent is stated to be suitable for the

manufacture of soap and candles, and the residue, after removal of the fat, is regarded as a most valuable cattle food on account of the very large proportion of albuminoids contained therein.

The *Strophanthus* Seed of Commerce. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xxiii. 868 and 927-931.) The author refers to the well-known difficulty of obtaining *Strophanthus* seed of uniform character, agreeing with the description given in the "Addendum" to the Pharmacopœia, and states that except by purchasing the follicles, it is now almost impossible to procure unmixed seed. The *Strophanthus* seed of commerce seems very frequently to consist of a mixture of seeds derived from various species. The author deals at some length with these species and their produce, and with some of the recent literature of this subject. For particulars the original paper should be consulted, as it cannot be condensed without losing much of its value. The paper concludes with a recommendation of the observation of the following points by collectors of *Strophanthus* plants in discriminating species:—

1. The shrubby or climbing character of the plant.
2. The hairiness or otherwise of the leaf and the prominence of the veinlets.
3. The relative length of the tails to the petals and of the glands at the base of the corolla lobes.
4. The colour and markings of the corolla.
5. The shape of the calyx lobes.
6. The colour of the seed and its hairiness or baldness, and the relative length of its awn and plume.

Constituent of Kola Nut and Cacao Beans. A. Hilger. (*Apoth. Zeitung*, 1892, 469.) E. Knebel's observation respecting the presence in kola nut of a glucoside, which on decomposition yields caffeine, glucose, and kola-red, is confirmed by the author, who also endorses the opinion that at an early period of development the nuts contain no ready-formed caffeine, but only the glucoside (compare *Year-Book of Pharmacy*, 1892, 161). An extension of this investigation to cacao beans now reveals the fact that these in the natural fresh condition contain neither theobromine, caffeine, nor cacao-red, but a glucoside soluble in alcohol capable of yielding these substances together with glucose on decomposition. In commercial cacao beans these products already exist as such, but they are always associated with a variable proportion of undecomposed glucoside. The latter may be isolated from the beans by removing the fat with petroleum ether, and the theobromine and glucose with cold water, and then extracting the glucoside by

means of alcohol. The residue left on evaporating the alcoholic solution is repeatedly purified by dissolving in weak solution of potassium hydrate and precipitating with dilute hydrochloric acid. The partial decomposition with glucoside occurring in the beans seems to be brought about by the presence of a diastatic ferment.

Constituents of Banana Fruit. W. M. Doherty. (*Chemical News*, lxvi. 187.) The author has submitted the Cavendish or Fiji variety of the banana fruit (*Musca Cavendishii*) to analysis, with the following results:—

Water	75.71 per cent.
Albuminoids	1.71 „
Total carbonaceous matter (non-nitrogenous)	20.13 „
Woody fibre	1.74 „
Ash	0.71 „

From these he draws the conclusion that bananas cannot be regarded as a nutritive food, and are not superior in nutritive value to potatoes.

Spurious Cubebs. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xliii. 121-122.) The author gives the following summary of the present state of knowledge respecting cubebs, and their substitutes met with in commerce:—

The cubeb plants cultivated in Java are of three kinds. These are in all probability *Piper Cubeba*, *Piper crassipes*, and a third variety, with fruits having a macy odour.

Piper crassipes may be distinguished by its larger size, long, slender, flattened stalk, and its bitter taste. It does not give a crimson colour with sulphuric acid.

The cubeb with a macy odour resembles the true cubeb in shape and size, but is greyer, more wrinkled, and does not give a crimson colour with concentrated sulphuric acid.

The fruits of *Piper Lewong* (*Cubeba Lewong*) are stated by Flückiger and Hanbury to be extremely cubeb-like; and as this species is a native of Java, it may possibly yield the cubebs with a macy odour. The author has not, however, been able to find in the national herbaria a specimen of this species in mature fruit.

The fruit of *Piper ribesoides* is collected in the Selama district of Perak in small quantity, but there is no evidence that it enters into English commerce.

Examination of the Spurious Cubebs derived from *Piper*

Ribesioides. E. Brooke. (*Pharm. Journ.*, 3rd series, xxiii. 734-735.) The author's examination of this drug shows the following results:—

Petroleum extract, 19·85 per cent.

Vol. oil, 6·28 per cent.; non-vol. fats and fixed oil, 13·57 per cent.

Ether extract, 3·08 per cent.

Two resins: one neutral, soluble in alcohol, 2·06 per cent.; one acid, insoluble in alcohol, 1·02 per cent.

Alcoholic extract, 1·48 per cent.

Chiefly extractive.

Aqueous extract, 7·64 per cent.

Colouring matter and extractive. No glucosidal matter, and free from sugar.

	Grams.
Total	32·05
Residue	67·26
Waste	·69

100·00

Moisture determined at 110° C. . . 1·75 per cent.

The ash was determined and examined side by side with that of ordinary cubebs. The latter was found to yield 8·01 per cent., of which only ·081 consisted of ferric oxide, whereas the fruit of *Piper ribesioides* yielded 4·87 per cent., containing 3·58 of ferric oxide. Owing to the great difference in the proportion of iron, the author tried whether this difference would be directly recognised in the aqueous solutions of the raw drugs. It was found that, on digesting the fruit of *Piper ribesioides* in acidulated water for about an hour, a copious blue precipitate was formed on the addition of potassium ferrocyanide, while no reaction was obtained when ordinary cubebs were similarly treated. A similarly striking difference was noticed in the reactions for starch, a cold decoction of ordinary cubebs giving only a very slight reaction with solution of iodine, whereas a decoction of *Piper ribesioides* gave quite an intense blue.

Daphnidium Cubeba. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xxiii. 846-847.) The author, in conjunction with A. De Wevre, arrives at the conclusion that the so-called *Daphnidium Cubeba* of commerce must in future be referred to *Litsea* (*Tetranthera*) *citrata*, the fruits of which are identical with the "citronelle fruits" from which Schimmel and Co. obtained an oil containing 30 per cent. of citral, the flavouring principle of oil of lemon.

Myrobalans. W. Adolphi. (*Archiv der Pharm.*, cccxx. 684-705.) Myrobalans, the fruit of *Terminalia chebula* and other species, contain, in addition to a large proportion of tannin, an acid having the composition $C_{28}H_{24}O_{19} + H_2O$, which the author describes under the name *chebulic acid*. The latter can be isolated by the following treatment, which yields about 3·5 per cent.:—The dried fruits are powdered, macerated for 10 days at the ordinary temperature with 90 per cent. alcohol, pressed, and filtered. The alcohol is completely removed from the extract, and the residue then dissolved in hot water; cold water is added until no further milkiness appears, and the whole is allowed to settle, and then filtered. To the filtrate, sodium chloride is added until a permanent turbidity appears, and the solution is then shaken out with ethyl acetate, which dissolves chebulic and tannic acids. To remove the latter, the ethyl acetate is distilled off, and the residue dissolved in water, and shaken out with ether; from the aqueous solution, crystals of chebulic acid then separate on standing, and may be recrystallized from hot water.

Composition of the Fruit of Gleditschia Triacanthos. E. Heckel and F. Schlagdenhauffen. (*Répertoire de Pharm.*, January, 1893.) The authors confirm the absence of alkaloidal constituents in this fruit, and show its composition to be as follows:—

	Per cent.
Wax.	0·625
Glucose and saccharose	37·650
Gum, pectin, and tannin	23·993
Albuminous matter	8·800
Lignin and cellulose	20·427
Salts.	9·003

The Useful Varieties of Nutmegs. Dr. Warburg. (From a paper read before the Berlin Pharmaceutical Society.) The author gives a detailed account of the nutmegs obtained from *Myristica fatua*, *M. argentea*, *M. fragrans*, and *M. succedanea*, and refers also to the arillus of *M. malabarica*, which, under the name of Bombay mace, is used as an adulterant of true mace. For particulars the reader is referred to a translation of the paper in *Pharm. Journ.*, 3rd series, xxiii. 11-12.

Note on the Persian Drug "Marv." O. Stapf. (*Pharm. Journ.*, 3rd series, xxiii. 745.) The author refers to Dymock's statement (*Veget. Mat. Med. of Western India*, 2nd ed., p. 703), that the seeds of *Phyllanthus maderaspatensis* are used in medicine for the mucilage they produce when put into water, and to the general

description given of these seeds in the same place. He points out that both this description and the statement of their secreting a mucilaginous matter are in contradiction to the qualities and the appearance of the seeds of *Phyllanthus maderaspatensis* and of other species of this genus. On examination of some of Dymock's supposed *Phyllanthus* seeds, he has found them to be the nutlets of a *Salvia*, which are sold under the name of "marv." A careful comparison with various species of this genus has enabled him to identify them as the produce of *Salvia spinosa*.

Ceratonia Siliqua. E. Heckel and F. Schlagdenhauffen. (*Répertoire de Pharm.*, 1892, 529.) The authors' examination of the pods of this plant shows the presence of the following constituents:—

	Per cent.
Fatty matters	0·3
Glucose	17·165
Saccharose	32·201
Free butyric acid	0·500
Wax, tannin, and colouring matters	4·501
Pectin, albuminoid matter, gum	7·75
Cellulose	34·946
Fixed salts	2·487

Constituents of *Lolium Temulentum*. H. Hofmeister. (*Apotheker Zeitung*, 1892, 544.) The author publishes the results of an analysis of the seeds of this plant, which seem to disprove the existence therein of the volatile alkaloid "*loline*," and of *temulentic acid* referred to by P. Antze, while showing that the so-called "*temulentine*" of the last-named chemist is a mixture containing some of the narcotic alkaloid isolated and described by the author under the name "*temuline*." The latter occurs in the seeds in the proportion of 0·06 per cent. It acts as a nerve poison, and has a composition represented by the formula $C_7 H_{12} N_2 O$. In addition to this the seeds appear to contain nitrogeous acid and a second uncrystallizable base.

Constituents of Poke Berries. H. Harms. (*Amer. Journ. Pharm.*, January, 1893.) The author's analysis shows the presence of the following constituents:—A crystalline principle (phytolaccin of Claussen), a glucoside, wax, fatty matters, mucilage, dextrin, glucose, saccharose, pectin, and albuminoids, pararabin, and a characteristic purplish-red colouring matter. The latter forms bright red or purple solutions with water, which are turned yellow by alkalies and reddened again by acids, and may be used as an indicator in titrations.

Constituents of *Datura Alba*. Y. Shimoyama and T. Koshima. (*Apotheker Zeitung*, vii. 458.) Previous to the introduction of chloroform, the capsules of this plant were used in Japan as an anæsthetic. The author has examined the seeds, and found them to contain hyoscyamine associated with a small proportion of atropine.

***Sorbus Aria*.** M. Duchesne. (*Rép. de Pharm.*, 1892, 227.) The fruit of *Sorbus aria* is known in Asia Minor under the name of idé, the pulp, mixed with water or milk, being used by the inhabitants in the feeding of infants. It is about the size of a small nut, of which the pulp amounts to about one-half the weight. According to an analysis by Gautrelet, it contains, in addition to cellulose, fat, carbonates, chlorides and phosphates of alkaline earths, 11.44 per cent. of glucose, 13.56 per cent. of sorbite, and 6.85 per cent. of nitrogenous matter.

Linseed Cake and Meal. M. Haselhoff. (*Landw. Versuchs-Stat.*, xli. 55-72.) Flax is chiefly grown in Germany for the flax; for seed it is almost only grown in Mecklenburg and Königsberg, and the seed is not of very good quality for the production of oil. The American seed is of about the same quality; the Indian (Bombay) is better, whilst the best seed is that from Russia, especially South Russia. Most of the impurities are removed by sifting; when there remains only 4 per cent. of foreign matter (or even 8 per cent., if the foreign matter consists of oily seeds), the seed is practically pure. With regard to the manufacture of linseed oil, the original method consisted in pounding the seeds. Now there are two methods by which the oil is pressed out; in the one heat is applied to the vessel containing the seeds (either by direct firing or steam), in the other the seed is directly treated with superheated steam. Another method is to extract with light petroleum. The residue (cake or meal) varies in composition according to the method employed. Thus, whilst the residue from pressed seeds contains about 32-36.4 per cent. of protein and 9-11 per cent. of fat, the residue from extracted seeds contains more proteids (40 per cent.) and less fat (3-4 per cent.). The amount of mucilage also varies; where direct steaming is employed, the amount is diminished, and cake so obtained will keep for years without becoming mouldy. This is also the case with cake prepared by the light petroleum method; but this seems to be due, not to the abstraction of mucilage, but to the action of the light petroleum.

For adulteration, not only vegetable substances, but also heavy

spar, gypsum, chalk, and salt are employed; saw-dust has been found. Rape-cake meal may be detected by stirring in water in a glass cylinder, and allowing to settle; if any dark particles are visible, rape is probably present. A few drops of aqueous alkali will give an intense yellow colour if rape is present. Amygdalin does not seem to be actually injurious, but mustard, corn-cockle, and *Camelina* are said to be injurious, whilst castor-oil is poisonous, and may cause death. Vegetable impurities can mostly only be detected microscopically, and the amounts only approximately estimated. But the amount of fat, and especially of protein, give a good idea as to purity or otherwise. When mineral impurities are present they may be detected by the amount of ash, which generally should not exceed 5 per cent. Cake containing over 14 per cent. of water cannot be considered as pure.

With regard to fat, it should be noted what results are obtained when the substance is (1) not previously dried, (2) when dried for two hours at 100–105°, and (3) when dried for two hours at 100° in an atmosphere free from oxygen: the results should not differ. The rancidity of the fat is determined (1) after the fat has been so long dried that it no longer has an unpleasant odour, and (2) without previous drying. The first estimation gives a lower result than the second, from loss of volatile fatty acids. The higher the percentage of acid the greater the difference in the two experiments; the estimation of rancidity of linseed residues, and in foods generally, should therefore be made in the fat from undried substance. The cake and meal were also examined bacteriologically; large numbers of micro-organisms were found, but the results give no indication of the quality of the substance examined, as the nature (injurious or otherwise) of the micro-organisms is not known.

A False Kamala. H. G. Greenish. (*Pharm. Journ.*, 3rd series, xxiii. 745–746.) The author gives a description of a sample of a false kamala recently occurring in the market. It was coarser than the genuine drug, not so mobile and of a heterogeneous nature, a dark-brown powder adhering to the finger when passed through it. The microscope showed the presence of dark reddish-yellow pollen grains, intermixed with vegetable debris containing portions of narrow petals and bifid styles. A fuller examination proved this spurious drug to consist of carelessly collected and badly preserved safflower, mixed with extraneous matter, and reduced to coarse powder.

Commercial Goa Powder. E. J. Millard. (*Chem. and Drugg.*,

November 19th, 1892.) The author has examined a number of commercial samples of Goa powder, with the following results:—

No.	Colour.	Percentage of Ash.
1	Brown	4.0
2	"	28.5
3	Greenish-brown	22.9
4	Brown	28.6
5	"	7.7
6	"	28.0
7	"	4.2
8	Dark brown	25.9

The ash consisted chiefly of Si O_2 , $\text{Al}_2 \text{O}_3$, and $\text{Fe}_2 \text{O}_3$.

The sample examined by Professor Attfield in 1875 yielded only 0.43 per cent. of ash.

Cherry-Tree Gum. F. Garros. (*Bull. de la Soc. Chim.*, vii. 625, and *Rev. inter. des fals.*) A perfect solution and good mucilage, comparing favourably with that of gum arabic, can be obtained from cherry-tree gum by adding to the water employed a few drops of hydrochloric or dilute sulphuric acid, and heating to 40–45° C. for 20 to 30 minutes.

The author has observed that when cherry-tree gum is left with water in a sterilized flask for some time, it liquefies, and an organized ferment is deposited, which he regards as the determining cause of the solution of the gum. It is more active in presence of ammonium tartrate, and is rendered inactive by the addition of 5 per cent. of hydrochloric acid. If added to a fresh mixture of the gum and water, solution is effected much more speedily than otherwise. The ferment is composed of cells resembling those of yeast.

Some Australian Gums. J. H. Maiden. (*Proc. Linn. Soc., N.S.W.*, vi. 680, vii. 35. From *Pharm. Journ.*) *Barrister Gum*.—A gum exuded by "The Barrister," *Mezoneurum scortechnii*, is described by the author as being horny and gelatinous-looking, resembling that of *Acacia decurrens* in external appearance. It is only slightly soluble in cold water, in which it swells up to several times its original bulk. Boiling water does not readily dissolve it, nor do potash and soda solutions. A canary-yellow colour appears when the gum is in these alkaline liquids, but this fades on cooling. Dilute hydrochloric acid dissolves it, and addition of an alkali in excess then causes a precipitate. Barium hydrate also causes pre-

precipitation from the acid solution, as in the case of tragacanth. The properties of barrister gum are evidently very similar to those of tragacanth, and its composition is given as follows :—Soluble in cold water, 16·5 ; soluble in acids, and insoluble in alkalies, 68·57 ; moisture, 10·95 ; ash, 3·98 per cent. It appears to contain neither arabin nor metarabin.

Panax Gums.—The author also gives detailed descriptions of several varieties of gum obtained from members of the genus *Panax* (*Araliaceæ*). He states that they closely resemble acacia gums in composition. The portions soluble in water consist entirely of arabin, and the remaining gums are partially soluble, though containing varying proportions of metarabin which causes them to swell in cold water. It is suggested that the product of *P. Murrayi* would form a valuable substitute for gum arabic. An odoriferous principle possessed by the panax gums is derived from the bark of the trees, most of the species having a strong smell of aniseed and celery, and one being hence termed the “celery-tree.” The gums are considered as consisting principally of the calcium, magnesium, and potassium salts of arabic acid.

The Gum Resin of *Garcinia Collina*. E. Heckel and F. Schlagdenhauffen. (*Répertoire de Pharm.* [3], v. 193.) This drug exudes from the bark of the tree as an orange-coloured substance which is soluble in alcohol, ether, chloroform, amyl alcohol, carbon bisulphide, and petroleum ether. The chemical properties of its resin constituent resemble those of the tannins. The composition and general properties of the gum resin are similar to those of ordinary gamboge from *Garcinia morella*, and it is therefore inferred that it will also be similar in its physiological action. The new drug, however, differs from ordinary gamboge in its solubilities, and in its containing a white crystallizable constituent melting at 235° C., and yielding, on heating beyond this temperature, crystals of *pyrocatechin* among the decomposition products. The crystalline constituent referred to proved on analysis to contain 71·99 per cent. of carbon, 7·91 per cent. of hydrogen, and 20·10 of oxygen.

Notes on the Exudations yielded by some Australian Species of *Pittosporum*. J. H. Maiden. (*Pharm. Journ.*, 3rd series, xxiii. 59–60, and 79–80.) The author gives a detailed account of the properties and composition of gum-resins obtained from *Pittosporum bicolor*, *P. undulatum*, and *P. rhombifolium*. As the descriptions given do not admit of useful condensation, the reader is referred for particulars to the original article.

A Resinous Product from Species of *Gardenia*. E. Heckel and

F. Schlagdenhauffen. (*Répertoire de Pharm.* [3], 5, 145.) The authors describe a resinous secretion enclosing the leaf-buds of *Gardenia Oudiepe*, *G. Aubryi*, and *G. sulcata* (Rubiaceæ). It is a yellowish substance of pleasant odour and agreeable taste, of 1.102 specific gravity, melting at 83° C., insoluble in water, and almost insoluble in petroleum ether and carbon bisulphide, but soluble in acetic acid, benzol, alcohol ether, chloroform, acetone, and acetic ether. Its composition approaches that of quinotannic acid, and its properties and reactions exhibit much analogy with the tannins generally. It is reported to be of value in the treatment of atonic ulcers.

The Resins of Ficus Rubiginosa and F. Macrophylla. E. H. Rennie and G. Goyder. (*Trans. Chem. Soc.*, No. 115.) An account is given of the results of an examination of the resin of *F. rubiginosa* by De la Rue and Müller, contained in a paper published in the *Phil. Trans.* of 1860, and the somewhat different results of the authors are then recorded. They have separated a crystalline substance from both resins externally closely resembling De la Rue and Müller's product, but giving numbers for carbon about 3 per cent., and for hydrogen about 1 per cent. higher; the numbers are most in accordance with the formula $C_{34}H_{56}O_2$. This substance is resolved by alkaline hydrolysis into acetic acid, and a crystalline substance melting at 114°, of the formula $C_{33}H_{34}O$, very closely resembling the substance described by De la Rue and Müller, which they obtained in a similar way.

Tanno-Resinous Exudation from Spermodopsis Gummifera. E. Heckel and F. Schlagdenhauffen. (*Répertoire de Pharm.*, v. 241.) This drug is obtained from the trunk and branches of the tree in thin, shining black masses or in small brownish black tears with translucent edges. They are strongly astringent, and contain as much as 79 per cent. of gallotannic acid. Attempts are being made in New Caledonia to use this exudation for tanning purposes.

Jalapin. T. Poleck. (*Zeitschr. des oesterr. Apoth. Ver.*, 1892, 391, 423 and 447.) The author confirms the identity of the resinous glucoside of *Ipomæa orizabensis* with scammonin (from *Convolvulus scammonia*), and regards it as probably also identical with tampicin of *Ipomæa similans*. The formula $C_{34}H_{56}O_{10}$, determined by W. Mayer, is found to be correct. By combination with 2 molecules of water it is converted into jalapic acid, $C_{17}H_{30}O_9$, which is bi-basic. On treatment with hydrochloric acid, jalapin takes up the elements of 5 molecules of water, forming glucose and the monobasic jalapinic acid, $C_{16}H_{30}O_3$. But attempts to confirm the

existence of the aldehyde product named jalapinol by Mayer and Samelson gave negative results.

In the author's opinion, the name jalapin for the glucoside here referred to should be given up in favour of *orizabin*, in order to prevent confusion, as the former name is commonly applied to other substances.

Copaiba. H. W. Snow. (*Western Druggist*, xiv. 325.) The author's experiments bear out the conclusion that the property of this oleo-resin of solidifying with magnesia is commensurate with the proportion of resin present in it. Samples of copaiba containing less than 48 per cent. of resin are found to be unsatisfactory for making a pill mass with the excipient named.

Copaiba. E. H. Worlée. (*Pharm. Zeitung*, January 21st, 1893.) The author states that genuine copaiba from Maracaibo and Angostura forms a perfectly clear solution with strong alcohol in all proportions, while in the presence of resin the solution is turbid or opalescent. The presence of this adulterant is also indicated by solution of ammonia, which forms with the adulterated oleo-resin a liniment of such consistence that after a short time it cannot be poured out of an ordinary narrow-mouthed bottle.

Caparrapi Balsam. T. Bayón. (*Pharm. Journ.*, 3rd series, xxiii. 1045-1046.) This so-called balsam derives its name from the village of Caparrapi, in the province of Cudinamarca, in the United States of Columbia, where it is prepared. It is obtained by incisions from the trunk of *Laurus giganteus*, a large evergreen forest tree belonging to the order *Lauraceæ*. The balsam is described as having an aromatic odour and varying in colour according to the age of the tree, but usually resembling balsam of Tolu. It is, however, more fluid than the latter. It is employed medicinally as a stimulant for catarrhal complaints, especially when of a chronic character, such as bronchitis, laryngitis, nervous catarrhal asthma, and also for chronic inflammation of the genito-urinary tract, such as catarrh of the bladder, leucorrhœa, and obstinate blenorrhagia. It is used in several preparations in the following proportions:—syrup, 30 to 50 grams; pastilles, 2 to 10 grams; tincture, 2 to 10 grams; electuary, 1 to 4 grams. It is also given alone in doses of $\frac{1}{2}$ to 2 grams, and may be administered in the form of pills, cigarettes, or fumigations. By the natives it is employed in the treatment of snake-bites and the stings of poisonous animals, as the ray and scorpion, and the poisonous arachnid, known locally as the "coya." For this purpose it is applied externally and given

internally in a dose up to 30 grams, according to the severity of the poison.

Origin of Benzoin. F. Lüdy. (*Archiv der Pharm.*, 1893, 43.) The author refers to an interesting observation made in Java by A. Tschirch that the trees yielding benzoin contain no secretion and have no secretion cells, that all parts of the tree are perfectly odourless, and that the exudation of an odoriferous balsam only commences after the tree has been wounded. Some of the bark brought home by Tschirch has been examined by the author, with the object of throwing light on the nature of the constituent which appears to give rise to the formation of the balsam. The uninjured bark was found to contain traces of wax, small quantities of phloroglucin and sugar, and large quantities of a tannin readily convertible by oxidation into a phlobaphen (benzophlobaphen) having the formula $C_{51}H_{50}O_{21}$. The author has also re-investigated the composition of the balsam itself, and has obtained from it two new constituents of an alcoholic nature, viz., a small quantity of benzo-resinol, a colourless crystallizable body of the formula $C_{16}H_{26}O_2$, and a large proportion of resino-tannol, a brown amorphous substance of the formula $C_{18}H_{30}O_4$, and reacting like a tannin. In view of these results, the author inclines to the opinion that benzoin is produced from the tannin of the bark.

Angophora Kino. J. H. Maiden. (*Pharm. Journ. of Australasia*, July 27th, 1892.) Angophoras are confined to the east coast of Australia; they are five in number, four of them being found in New South Wales, while one, *A. Woodsiana*, is peculiar to Queensland. *A. cordifolia* is peculiar to New South Wales; *A. intermedia* has the widest range, extending from Victoria to Queensland. *A. lanceolata* and *A. subvelutina* are found in Queensland as well as in New South Wales. They are well known as "apple trees." All these species are stated to yield kinos similar in composition to those derived from *Pterocarpus*, but differing from the latter by having a marked odour. The author gives a description of the various species named, and also of two samples of kino obtained from *Angophora lanceolata*. One of these samples is described as being exceedingly brittle, breaking with a bright fracture, ruby with a tinge of brown, and yielding an orange-brown powder. Its odour resembles that of sour wine. It dissolves freely in cold water, forming a solution of the colour of brown sherry if left undisturbed. With alcohol it yields a pale orange brown solution with a slightly muddy residue. The second sample is stated to be hardly as red as the first, and to yield a powder of

a dark buff colour. The solution in cold water is somewhat less turbid and lighter in colour. In other respects it is like the other sample. Both have the following characteristic in common:—If they be digested in water, and the turbid liquor be treated with ether, two ethereal layers are formed, containing catechin in solution. This substance may readily be obtained by evaporation of the ether, and it possesses the characteristic odour of the kino from which it was obtained, the residue, insoluble in ether, being quite destitute of odour. The odoriferous principle (a volatile substance allied to cinnamene or styrol) is, however, so small that an hour's exposure of the ethereal extract to the atmosphere removes every trace of it.

A New Australian Kino. J. H. Maiden. (*Proc. Linn. Soc., N.S.W.*, vi. 679. From *Pharm. Journ.*) The author describes a new kino, obtained from the "Native Wistaria," *Milletia megasperma*. It occurs as a ruby-coloured, transparent substance, breaking readily with a clear, conchoidal fracture, and is powerfully astringent. The kino is soluble in cold alcohol and in water, forming a rose-tinted solution with the latter. It consists essentially of tannin and water, its composition being stated as—tannic acid, 78·2; ash, ·8; moisture, 20·1; insoluble impurities, ·9 per cent. This is the first record of a kino occurring in the Leguminosæ in Australia.

Astringent Gum from Mashonaland. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xxiii. 585.) In the spring of 1892 a specimen of an astringent gum was presented to the Pharmaceutical Society's Museum, accompanied by the statement that it was collected near Salisbury, Mashonaland, that it was very astringent, and resembled kino. Botanical specimens of the tree yielding this gum have since been obtained by the author, and found to correspond in every respect with *Brachystegia spicæformis*.

Note on an African Kino. A. W. Southall. (*Ibid.*, 600–601.) A sample of the Mashonaland kino referred to in the preceding abstract has been chemically examined by the author, and found to be closely allied to the kino imported from Malabar. Its solubility in spirit and water is nearly the same, while the proportion of tannin is somewhat greater, and that of the ash notably less than is found in ordinary kino. The tannin appears to be identical with kino-tannic acid. On account of the greater astringency of this drug and the brighter colour of its solution, the author regards it as suitable for use in some preparations employed in pharmacy, such as astringent lozenges, liquid dentifrices, etc.

Myoporum Manna. J. H. Maiden. (*Pharm. Journ.*, 3rd series, xxiii. 608.) The author has ascertained that this manna, obtained from the *Myoporum platycarpum*, consists almost entirely of mannite, and is practically identical with the product of *Frazinus Ornus*. On combustion, figures were obtained indicating the formula to be $C_6 H_{14} O_6$, and a quantitative determination showed the composition to be as follows:—

Mannite	89.65 per cent.
Glucose	2.87 "
Other sugars	0.51 "
Moisture	3.50 "
Ash and sand	1.10 "
Loss	2.37 "

Japanese Opium. M. Uyeno. (*Apotheker Zeitung*, vii. 454.) The author publishes the results of analyses of four samples of Japanese opium obtained from the province of Mije. The samples were found to contain from 10.0 to 12.9 per cent. of morphine, and from 7.3 to 11.0 per cent. of narcotine. A good deal of the opium produced in that province is stated to be sufficiently rich in morphine to satisfy the requirements of the Japanese Pharmacopœia.

Indian Opium. B. H. Paul and A. J. Cownley. (*Pharm. Journ.*, 3rd series, xxiii. 505.) The authors have examined a sample of the Patna opium issued by the Medical Store Department of Bengal for medicinal use. The sample contained 3.2 per cent. of moisture. In the dried opium the amount of morphine was found to be 8.55 per cent. A tincture made with the dried opium according to the directions of the British Pharmacopœia was found to yield 21.3 grains of dry extract per fluid ounce. The amount of morphine contained in the tincture was 2.74 grains per fluid ounce. For the sake of comparison, another tincture was prepared with a good sample of Turkey opium containing, in the dry state, 10.84 per cent. of morphine. This tincture yielded on evaporation 19.8 grains of dry extract per fluid ounce. The amount of morphine in it was 3.4 grains per fluid ounce. Both these tinctures were of the ordinary character, and there was scarcely any perceptible difference in their appearance.

Succus Taraxaci. L. E. Sayre. (*Amer. Journ. Pharm.*, August, 1892.) Fresh dandelion roots collected in May yielded by pressure 57 per cent. of juice, of specific gravity 1.007, and containing 1.472 per cent. of total solids, 0.036 per cent. of sugar, and 0.0045 of mineral constituents.

A Reaction of Aloes. L. Schoutelen. (*Chem. News*, May

26th, 1893. From *Zeitschr. des österr. Apoth. Ver.*) The author states that a concentrated solution of borax produces in liquids containing aloes, on standing for 20 to 25 minutes, a green fluorescence, which disappears very slowly.

Champacol. E. Merck. (Merck's *Jahresbericht*, 1892.) Under this name the author describes a kind of camphor obtained from champaca wood by distillation with water. After purification it melts at 86–88° C., has the form of long white felted needles, has no odour when pure, but when kept in an impure state becomes liquid and develops the agreeable odour of champaca wood.

Oil of *Jatropha Curcas*. MM. Arnaudon and Ubaldini. (*Monit. Scient.* [4], vii. 447.) The author gives a description of the physical properties of this oil, which, with the exception of the lower specific gravity, do not seem to differ essentially from those of castor oil. The principal difference of the two oils appears to consist in the relative proportions rather than in the nature of their constituents.

Vegetable Waxes. (*American Druggist.*) The chief varieties of vegetable wax, among which are included certain substances known as "vegetable tallow or fats," comprise the following:—

1. *Carnauba wax*, called also Ceará or Brazil wax, from *Copernicia cerifera*.

2. *Pela wax*, or Chinese wax, from *Frazinus chinensis*.

3. *Sumach wax*, or Japan wax, from several species of *Rhus*.

4. *Kaga wax*, from *Cinnamomum pedunculatum*.

5. *Ibota wax*, from *Ligustrum ibotu*.

6. *Stillingia tallow*, or Chinese vegetable tallow, from *Stillingia sebifera*.

7. *Myrica wax*, or myrtle wax, from *Myrica cerifera*.

8. *Orizaba wax*.

9. *Wax from stick-lac*.

10. *Bahia wax*.

Alcohol, ether, chloroform, petroleum spirit, and alcoholic solution of potash exert a solvent action on the various kinds of wax met with in commerce, and the behaviour of the solutions with solution of ammonia and with alcoholic solutions of lead acetate and of ferric chloride has formed a means of distinguishing them from one another. The process is as follows:—A sample of the wax is heated with ten times as much chloroform to boiling, and, when completely dissolved, cooled in cold water.

1. The chloroform solution remains clear after cooling.

A. Ether dissolves completely.

(a) Alcoholic solution of ferric chloride gives, with the alcoholic solution of the wax, a precipitate insoluble on heating—*wax from Myrica quercifolia*.

(b) Ferric chloride colours alcoholic solution black—*wax from undetermined species of Myrica*.

(c) Ferric chloride colours brownish, but gives no precipitate—*wax from Myrica cerifera*; *wax from Orizaba*.

B. Ether dissolves only a part. A sample is boiled with ten times the quantity of alcoholic potash solution till saponified, and the soap heated with 100 volumes of water.

(a) The soap is completely soluble—*Japanese wax*.

(b) The soap is partially soluble—*African beeswax*.

2. The chloroform solution becomes cloudy on cooling.

A. Alcoholic solution of acetate of lead gives, with the alcoholic solution of the wax, after a few minutes' standing, a cloudiness—*wax from stick-lac*.

B. Alcoholic solution of acetate of lead gives no cloudiness.

(a) The ethereal solution of the wax becomes cloudy on the addition of an equal volume of alcohol—*Brazilian wax*.

(b) The ethereal solution remains clear—*Bahia wax*.

Ambergris. G. Pouchet. (*Répertoire de Pharm.*, August, 1892; also S. Jourdain, *Journ. de Pharm. et de Chim.*, August 25th, 1892.) A microscopic and chemical examination of different samples of this drug shows the presence of acicular crystals (best seen in polarized light), together with a large proportion of a black pigment, and some excremental matters characterized by the presence of fragments of the jaws of cephalopodes. The black colouring matter is also said to be derived from cephalopodes. Ambergris may be considered as a product analogous to intestinal calculi.

Report on the Malayan Fish Poison called Aker Tuba, Derris Elliptica. L. Wray, junr. (*Pharm. Journ.*, 3rd series, xxiii. 61-62.) The fish-poison known by the Malayan name of *Aker tuba* is the root of a papilionaceous woody climber called *Derris elliptica*. This plant bears bunches of pretty, fragrant, white flowers tinted with pink and pale buff, which are followed by thin, flat, blunt-ended pods, $2\frac{1}{2}$ inches long by 1 inch broad, containing one or two seeds. The leaves are pinnate, with seven to thirteen leaflets, and are whitish beneath. It flowers in Perak in February and March, and the fruit ripens in May or June. The plant grows wild on the plains in Perak, and is also rather extensively cultivated. The roots are brought into commerce done up in bundles.

They are the most virulent part of the plant. They have a rather pleasant aromatic resinous smell, bearing a slight resemblance to that of liquorice root. When cut, they exude a white milky sap, which under the microscope is seen to be an emulsion. They are largely used by the Chinese market gardeners as an insecticide. The main use was, however, until the prohibition came into force, as a fish-poison.

The author finds that 20 grains of the green root will render one gallon of water sufficiently poisonous to kill fish. The poisonous principle is not an alkaloid, but a resinous substance, for which the name "tubaïn" is proposed. It is very brittle, reddish-brown, quite insoluble in water, paraffin oil, and benzol, but soluble in alcohol, ether, and chloroform. It has a specific gravity of 1.1662; is dissolved by nitric acid, forming a bright dragon's-blood red solution; and is unacted on by strong boiling solution of carbonate of soda. When heated in a glass tube it melts, boils, and then carbonizes, a brown-coloured oil condensing on the cool part of the tube. It burns with a large smoky flame, leaving a quantity of carbonaceous ash. It is most conveniently prepared by crushing the chopped root and digesting it, with little heat, for some hours in alcohol acidulated with hydrochloric acid, filtering and evaporating on a water-bath at a low temperature until a gummy substance separates. When all the spirit has evaporated and water only remains, the tubaïn may be removed and pressed into a mass. This can then be washed by kneading in hot water and further purified by re-solution in alcohol and repeating the above process. The result will be the resinous substance above described. The roots should be digested a second time in fresh alcohol. The dried root yields 9.42 per cent. of tubaïn by the above process. When tubaïn is dissolved in spirits of wine and left to stand, a granular deposit of a dirty white colour is formed, which is only sparingly soluble in cold alcohol, but is dissolved by hot alcohol, chloroform, and ether. This granular body re-deposits on evaporation from ether as a pure white crystalline tasteless mass. From its solution in chloroform it is left as a clear white varnish. When heated it melts into a transparent white fluid, which on an increase of heat turns brownish-red and partly distils, unaltered. This substance, when freed from all traces of tubaïn, is not poisonous to fish. The acid aqueous solution left after the deposition of the tubaïn, and which contains presumably any alkaloids present in the roots, is also not poisonous.

The author states that one part of tubaïn in 350,000 parts of

water proves quickly fatal to fish, and water containing the extraordinarily small quantity of one millionth,—i.e., 1 grain in 143 pounds of water,—will kill fish in from one quarter to half an hour, according to the species. There seems to be considerable difference in the susceptibility of various kinds of fish to the effects of the poison.

In conclusion the author advocates the use of this poison for the destruction of the many insect pests to which garden and greenhouse plants are subject, an application which is already extensively practised in China.

We may add that attention has already been called to this poison a few years ago by Greshoff, who described it under the name of "derrid" (see *Year-Book of Pharmacy*, 1891, 183). The author of the present report has evidently been unaware of this previous investigation.

The Arrow-Poison of the Ainos. S. Eldridge. (*Nature*, xlv. 475.) According to B. Schreube, this poison is prepared from the young roots of *Aconitum Japonicum*. The results of the author's chemical and physiological investigation confirm the supposition that aconite is the active ingredient, and seem to indicate that other, probably inert, substances are also present in the compound.

Preliminary Notice of the Arrow-Poison of the Wa Nyika and other Tribes of East Equatorial Africa. T. R. Fraser and J. Tillie. (Abstract of a paper read before the Royal Society, March 23rd, 1893.) Burton, Cameron, and other travellers have given accounts of much interest of an arrow-poison used in warfare and in the chase by the Wa Nyika, Wa Kamba, Wa Gyriama, and other tribes of Eastern Equatorial Africa. The poison was stated to be prepared from the wood of the stem and root of a tree, which, however, was not botanically identified. The authors have now examined this poison, together with the wood from which it is prepared, and also the leaves and fruit of the plant yielding it, and have identified the plant as a species of *Acokanthera*. They have isolated both from the poison and the wood a crystalline glucoside and active principle having a composition corresponding to the formula $C_{30}H_{52}O_{14}$, and agreeing in its physical and chemical characters with a crystalline substance separated by Arnaud from the wood of a plant obtained in the Somali country and belonging to the same genus. It crystallizes from hot alcohol in slender needles and from water in quadrangular plates, is slightly soluble in water and alcohol, less so in acetone, amyl alcohol and petroleum

ether, and quite insoluble in ethyl ether and chloroform. With strong sulphuric acid it immediately forms a pink coloration, which soon darkens to a brick-red, and then slowly fades to pale brown. Dilute sulphuric acid, with moderate heat, changes the colourless crystals rapidly to brick-red, and then gradually chocolate and green colours are developed.

The minimum lethal dose of the active principle was found to be between 0.00004 and 0.00005 grain per 100 grains of weight of frog. Rabbits succumbed to the subcutaneous administration of $\frac{1}{100}$ grain per lb. of body weight. A detailed description of the pharmacological effects will be found in the paper.

Ouabaio, Wabei, or Wabajo Arrow-Poison. E. M. Holmes. (*Pharm. Journ.*, 3rd series, xxiii. 965-966.) In the year 1882, some roots, stems, and leaves of the plant said to yield the ouabaio arrow-poison of the Somalis, were sent from Africa to France by M. Revoil. A chemical investigation of this material was made by M. Arnaud, who obtained from it a glucoside which he named ouabaïn. The physiological effect of the plant was determined by M. T. de Rochebrunne, and was found to be that of a cardiac poison. A botanical examination of the leaves by MM. Franchet and Poisson led those botanists to refer the plant to the genus *Carissa*, and to consider it to be nearly allied to *C. Schimperi*. As this species does not possess the spines characteristic of most species of *Carissa*, and is placed by modern botanists in the closely allied genus *Acokanthera*, M. Cathelineau has suggested the name *Acokanthera Ouabaio* for it, and this name has been subsequently adopted by M. Arnaud. A microscopical examination of the ouabaio stem made by M. Cathelineau, shows that it possesses the structural peculiarities characteristic of the species of the genus *Acokanthera*, viz., sclerogenous cells at the same time in the pith, pericycle, and liber. These have not been found in the genus *Carissa*, except in *C. Arduina*.

The author has recently examined some leaves of the plant from which M. Arnaud obtained ouabaïn, and which were presented to the Pharmaceutical Society's Museum by Prof. Cornu. A careful comparison of these leaves with those of M. Revoil's specimen of the ouabaio plant, and with the other species of *Acokanthera* in the Kew Herbarium, have satisfied the author that the wabei, wabajo, or ouabaio arrow-poison is indeed derived from *Acokanthera Schimperi*.

According to M. Cathelineau, the root of *Acokanthera Schimperi* occurs in pieces about $\frac{3}{4}$ to $1\frac{1}{2}$ inch in diameter. It is of a greyish

brown colour externally, cracked longitudinally, and occasionally transversely also, but in a less regular manner. The outer surface is soft and spongy, and easily abraded by the nail. Under a good lens, a transverse section of the bark is seen to consist of two well-marked layers. The outer, owing to the cork cells penetrating the liber, is marked with a network of darker lines, the outer meshes having white dots representing the cut laticiferous vessels, and darker circular dots consisting of bundles of sclerenchymatous cells. The inner layer is seen as a definite line of denser tissue closely adherent to the wood, with numerous bundles of similar cells. The wood is yellowish white, tough, and minutely porous, with well-marked but narrow medullary rays. The bark, macerated in water, gives a dark-brown solution, with but little bitterness. The wood, however, possesses a very bitter taste. Ouabaïn, when pure, is stated to have no appreciable bitterness.

The transverse sections of the root bark and stem are illustrated by woodcuts.

With regard to the active principle ouabaïn, the author mentions that the stem and root of *Acokanthera Schimperi* yield .3 per cent, while as much as 4-5 per cent. can be obtained from the seeds of *Strophanthus glaber*.

Physiological Action of Atropine and Pilocarpine. J. P. Morat and M. Doyon. (*Comptes Rendus Soc. Biol.*, 1892, 707-710.) These two alkaloids are found to have an antagonistic action on the respiratory movements, the latter being accelerated by atropine and retarded by pilocarpine.

Physiological Action of the Bases of Gelsemium Sempervirens. M. Cushny. (*Pharm. Journ.*, 3rd series, xxiii. 985. From *Archiv für exper. Pathol. und Pharmacol.*) The author has investigated the action of the two bases obtained from this plant by Gerrard and by Thompson. The crystallizable base named by Gerrard gelsemine, but known in Germany as "crystallized gelseminine," was prepared from the crude base met with in commerce, and it was found to possess all the characteristics described by Gerrard and Thompson. The other base, for which the name gelseminine has been adopted, was obtained at first in the form of a brown resinous mass. After purification it was still amorphous, though free from colour, but became yellow on the addition of acids. The chief result arrived at is that the physiological action of this amorphous base is very much more powerful than that of the crystallizable base. Subcutaneous injection of one milligram produced in frogs slight narcosis, which continued for some length of

time, while five milligrams of the crystalline base did not produce a very decided toxic effect. Gelseminine dilates the pupil most readily when applied locally, but at the same time causes pain and reddening of the conjunctiva, effects corresponding to those observed by Tweedy as being produced by the base to which the name "gelseminine" was applied by Wormley. The general result of the author's experiments is that they do not point to any useful therapeutic application of the gelsemium bases. He suggests for the crystalline base the formula $C_{49}H_{83}N_5O_{14}$, and for the amorphous base $C_{42}H_{47}N_3O_{14}$.

Physiological Action of Benzoylpseudotropine. Dr. Hugen-schmidt. (*Sem. Med., Nouv. Rém.*, ix. 56.) Benzoylpseudotropine (tropacocaine) is found to be much less poisonous than cocaine, and to be more energetic and thorough in its action as a local anæsthetic than the latter, over which it is stated to have the further advantage that its solutions can be kept unchanged for several months owing to its antiseptic properties.

Physiological Action of Cocaine. B. Danilewsky. (*Pflüger's Archiv*, li. 446-454. From *Journ. Chem. Soc.*) In the numerous researches on this subject, attention has been specially directed to the action of cocaine on sensory nerves. It has, however, also an action in paralysing motor nerves. Langlois and Richet state that the toxic action of cocaine is proportional to the development of the cerebral system.

In the present research, observations were made on various aquatic animals belonging to the groups of the coelenterata, echinodermata, worms, arthropoda, and mollusca. A small quantity of cocaine was added to the water, the concentration of the mixture varying from 1 to 1000-3000.

The general result may be summed up by saying that cocaine is a protoplasmic poison; it is an anæsthetic to all kinds of animals; and that its action has no relation to the development of the nervous system, still less of a central nervous mechanism.

The Diuretic Effects of Theobromine. W. Cohnstein. (*Pharm. Zeitung*, February 11th, 1893.) The author discusses the question to which class of diuretica theobromine must be considered to belong. He finds that this alkaloid exercises no appreciable action on the heart and vascular system, and that its diuretic effects must be attributed to a direct stimulation of the kidneys.

Carpaine as a Substitute for Digitalis. Dr. v. Oefele. (*Merck's Bulletin*, 1892, 279.) Carpaine is an alkaloid of the formula $C_{14}H_{27}NO_2$, which was isolated by Greshoff from the

leaves of *Carica Papaya* (see *Year-Book of Pharmacy*, 1891, 182). The author has investigated its merits as a cardiac remedy, and arrives at the conclusion that, though for internal administration it presents no advantages over other digitalis substitutes, it is decidedly superior to them for hypodermic use. It is thoroughly efficient, and may be injected without fear of producing any irritation or abscess.

Pangaduine, an Alkaloidal Preparation from Cod-Liver Oil. J. Bouillot. (*Comptes Rendus*, cxvi. 439-441.) The author applies the name *pangaduine* to the mixture of all the alkaloids contained in cod-liver oil. It is soluble in alcohol and an aqueous solution of glycerin, and may be extracted from the latter by the oil. It is stated to be of great value in tuberculosis, gout, rheumatism, diabetes, and neurasthenic weakness,—in short, in all diseases associated with imperfect nutrition.

The author finds that the alkaloids of cod-liver oil are not produced by any process of fermentation, but that they are of biliary origin, and pre-exist in the normal hepatic tissue.

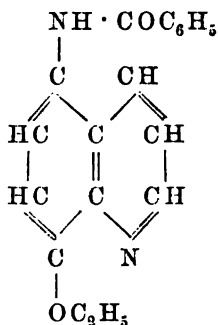
Combination of Cantharidin with Cocaine for Therapeutic Use. M. Hennig. (*Apoth. Zeitung*, 1892, 522. From *Berl. Klin. Wochenschrift*.) This preparation, made by the union of 2 molecular weights of cocaine hydrochlorate with 1 molecular weight of cantharidin dissolved in 2 m.w. of sodium hydrate, is not a chemical compound, but merely a mixture from which, however, the sodium chloride is removed. It is claimed to have notable therapeutic advantages over the cantharidates in the treatment of pulmonary tuberculosis and chronic catarrhal affections of the air passages. The remedy presents the appearance of an amorphous, white, odourless powder of unpleasant, pungent taste; it is soluble in boiling water, and insoluble in alcohol, ether, and benzine. On account of its greater stability the solution intended for subcutaneous injection should be made with chloroform water, and the dose to be injected should be equivalent to $\frac{1}{10}$ milligram of cantharidin.

Teucrin. v. Mosetig-Moorhof. (*Pharm. Centralhalle*, 1893, 89.) The preparation described under this name is a sterilized alcoholic extract obtained from an aqueous extract of the dried plant of *Teucrium Scordium*. It is a dark-brown liquid of characteristic odour and acid reaction. It is used hypodermically, and has been found to be a valuable remedy in the treatment of fungoid local diseases and abscesses.

Antipyrine as a Remedy in Lead Colic. M.M. Devie and

Chatin. (*Pharm. Zeitung*, February 11th, 1893.) The author has successfully employed antipyrine in several cases of colic arising from lead-poisoning. Its effect, like that of extract of belladonna, in such cases is attributed to a distending action on the blood-vessels.

Analgene. (*Pharm. Centralkalle*, 1892, 698, and *Deutsch. Med. Wochenschr.*) This body was introduced a short time ago as an anti-neuralgic (see *Year-Book of Pharmacy*, 1892, 197). It is now found that the substitution of the benzoyl radical in place of the acetyl radical in this preparation is a decided advantage, and this compound will therefore in future be ana-monobenzoylamido-quinoline, the constitution of which is represented by the formula:—



Analgene is given to adults in doses of 0.5–2 grams, and is stated to be free from the injurious effects accompanying the use of other remedies for the relief of pain. It is practically insoluble in water and quite tasteless, and fuses at 208° C.

Extract of Hydrastis Canadensis in the Vomiting of Pregnancy. Dr. Fedorow. (*Revue de Thérap.*, 1892, 388.) The author recommends the administration of 20 drops of fluid extract of hydrastis four times a day in these cases. The drug acts by reducing the arterial pressure, relieving the congestion of the uterus, and by calming the excitability of the vaso-motor centres of the gastro-intestinal tract.

Benzosol (Benzoylguaiacol) as a Remedy in Diabetes. A. Jolles. (*Pharm. Post.*, 1893, 101 and 114.) The author points out that the claim of this preparation as a successful remedy for diabetes rests to some extent on urine tests by means of the polariscope, and shows at the same time that the urine of non-diabetic persons to whom this remedy is administered is lævo-rotatory.

It is necessary, therefore, to supplement the indications of the polariscope by chemical tests for sugar in order to draw correct conclusions respecting the value of this remedy.

Benzol as a Therapeutic Agent. W. Murrell. (*Chemist and Druggist*, January 28th, 1893. From *Med. Press*.) The author states that benzol is not only a toxic agent, but in small doses possesses useful medicinal properties. The formula he usually employs is: Pure benzol, $1\frac{1}{2}$ drachms; oil of peppermint, $\frac{1}{2}$ drachm; and olive oil to 2 oz. This is stated to make a palatable preparation. The dose is from 10 to 30 drops on sugar every three or four hours. The author has used it in some cases of influenza, and in over a hundred cases of chronic bronchitis and winter cough. It is an expectorant and sedative, and has been found highly beneficial even in very obstinate cases. In the doses mentioned it has never been observed to produce any injurious effect.

Guaiacol Carbonate and Creasotal as Therapeutic Agents. J. Brissonnet. (*Répertoire de Pharm.*, October, 1892, 440; also M. Chaumier, *Bull. gén. de Thérap.*, December, 1892, 519.) Both papers confirm the value of guaiacol carbonate in the treatment of pulmonary phthisis and the advantages it possesses over guaiacol (compare *Year-Book of Pharmacy*, 1892, 194).

Chaumier also reports very favourably on the corresponding compound of creasote, which he considers as preferable even to the guaiacol carbonate for the same purposes. It is described under the name "*creasotal*." In the intestines it splits up into carbonic acid and creasote, and thus produces the action of the latter without interfering with the digestive process.

Salocoll. (*Pharm. Zeitung*, 1893, 183.) Salocoll is a commercial name applied to phenocoll salicylate, which is recommended in the place of the hydrochlorate as an antipyretic, antineuralgic, and antirheumatic, in doses of one to two grams.

Therapeutic Properties of Formanilid. (*Pharm. Zeitung*, 1893, 160.) Formanilid, $C_6H_5NH \cdot COH$, is recommended as an analgetic, anæsthetic, antipyretic, antineuralgic, and hæmostatic, and is stated to combine the properties of acetanilid, antipyrine, and cocaine. It crystallizes in prisms soluble in water and more freely in alcohol, and melting at $46^\circ C$. A three per cent. solution injected subcutaneously or into the urethra produces anæsthesia. As an external styptic it is stated to be superior to antipyrine.

Coryl, a New Anæsthetic. (*Journ. de Pharm. d'Anvers*, January,

1893, 16.) The preparation introduced under this name is a mixture of methyl and ethyl chloride, and is used as a local anæsthetic in dentistry and in minor surgical operations. Though it does not produce as great a cold as methyl chloride, it has the advantage of being still liquid at 0° C.

Eugenol-Acetamide, a New Anæsthetic. (*Pharm. Centralhalle*, 1892, 441.) This preparation is stated to be equal to cocaine as a local anæsthetic, and to combine with this effect a powerful antiseptic action. It produces no local irritation. It crystallizes from water in scales and from alcohol in needles, fusing at 110° C. It is obtained by converting eugenol successively into eugenol-sodium, eugenol-acetic acid, ethyl eugenol-acetate, and eugenol-acetamide.

The Action of the Volatile Oil of *Atherosperma Moschata*. R. Stockman. (*Pharm. Journ.*, 3rd series, xxiii. 512; *Chemist and Druggist*, December 24th, 1892, 892.) *Atherosperma moschata*, or Australian sassafras, is a tree growing in South Australia and Tasmania, and belonging to the natural order *Monimiaceæ*, tribe *Atherospermeæ*. The bark has been used as a substitute for tea, while a decoction and a tincture have been employed therapeutically as an alterative in rheumatism and secondary syphilis, as a diuretic and diaphoretic, and as an expectorant in bronchitis. In 1861 Zeyert isolated from the bark an alkaloid, atherospermine, regarding the physiological action of which nothing is known. Bosisto has obtained from the bark an essential oil which has been given in heart disease, and is stated to require great caution in its administration, one drop being considered a full dose. This statement has induced the author to investigate both the volatile oil and the bark with regard to their physiological action. He arrives at the conclusion that neither the oil nor any other constituent of the bark is particularly active or poisonous, and further, that the oil has a close resemblance in physiological action to other volatile oils. Respecting its uses as a diaphoretic, expectorant, and alterative, he considers that it is simply similar to the many other essential oils or plants containing them which are used in medicine for similar purposes.

Turpentine as an Antidote to Phosphorus. O. Bush. (*Pharm. Journ.*, 3rd series, xxiii. 183.) The author has experimented upon dogs, cats, rabbits, and fowls, to ascertain the action of turpentine in cases of poisoning by phosphorus. The phosphorus was given by the mouth or as hypodermic injections, in quantities in excess of fatal doses, and an emulsion of turpentine subsequently administered. As a result it was found that the action of the

phosphorus was, within certain limits, distinctly impeded, and the author therefore recommends the use of turpentine as an antidote in cases of poisoning from this substance. At the same time the use of emetics and of the stomach pump should not be neglected. It is suggested that the action of the turpentine may be due to the formation of an analogous compound to that obtained by Koehler, and named by him terebinthophosphoric acid. This, though poisonous, is much less energetic in its action than phosphorus itself.

Eucalypteol. M. Anthoine. (*Journ. de Pharm. et de Chim.* [5], xxvi. 391-394, and *Bull. Gén. de Thérap.*, cxxii. 316 and 433.) The name eucalypteol is given to a crystalline dihydrochloride, $C_{10}H_{16}, 2HCl$, obtained in the action of hydrochloric acid on eucalyptus oil. It fuses at $50^{\circ}C.$, boils at $115^{\circ}C.$, and resembles in its general properties the corresponding dihydrochloride obtained from oil of turpentine. It possesses antiseptic properties, and is given internally in doses of 1 to 1.5 gram daily. Even in very much larger doses it produces no toxic action. It produces no irritation, is well borne by the stomach, and does not hinder the action of enzymes.

Phenosalyl, a New Antiseptic. (*Amer. Journ. Pharm.*, November, 1892.) This antiseptic, introduced by Dr. de Christmas, is a mixture consisting of 9 parts of phenol, 1 part of salicylic acid, 2 parts of lactic acid, and 0.1 of menthol. In preparing it the first three ingredients are heated together until completely liquefied, and the menthol is then added. The product is very soluble in glycerin, and dissolves in water in the proportion of 1-25. It is used as a disinfectant, being able to sterilize, in aqueous solution, tuberculous expectoration and anthrax cultures.

Sodium Paracresotate as an Internal Antiseptic. Prof. Demme and A. Loesch. (*Revue Gén. de Clin. et de Thérap.*, 1892.) Sodium paracresotate is recommended by the authors in infantile diarrhoea, and given at first in small and gradually increasing doses. The maximum daily quantities are 0.5 gram for children under two years, 1 gram for those between two and four years, and 3 grams for children ten years old. It is given in aqueous solution in conjunction with tincture of opium and brandy, and is stated to act as an internal antiseptic, disinfecting the stools and diminishing their frequency.

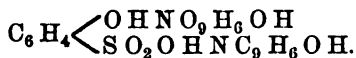
Sozal. Dr. Schaerges. (*Pharm. Zeitung*, 1892, 489.) The new antiseptic introduced under this name is the aluminium salt of paraphenolsulphonic acid, $Al_2(C_6H_4OHSO_3)_6$, and occurs in

the form of small granular crystals of a weak, phenol-like odour and strong astringent taste, readily soluble in water, glycerin, and alcohol, forming permanent solutions. It may be obtained either by dissolving aluminium hydrate in paraphenolsulphonic acid, or by double decomposition of aluminium sulphate and barium paraphenolsulphonate. It is stated to be very useful for antiseptic dressings.

Alumol, an Astringent Antiseptic. MM. Heinz and Liebrecht. (*Pharm. Centralhalle*, 1892, 697.) Alumol is a naphthol-sulphonate of aluminium containing 5 per cent. Al. It is a white, non-hygroscopic powder, very soluble in water and soluble in alcohol with a blue fluorescence. It is also soluble in glycerin, but insoluble in ether. With hot water, solutions containing as much as 40 per cent. can be obtained which do not precipitate on cooling. Aqueous solutions have a slight acid reaction; they reduce silver nitrate, produce a blue coloration with ferric chloride, and form precipitates with albumen and gelatin which are readily soluble in an excess of these two substances. A solution containing but one part per 1,000 has a distinctly astringent taste. Owing to its solubility in pus, it does not cause any clogging when applied to pus-secreting sores. A special use of the substance in ophthalmical practice is noted by Wolffberg, a 4 per cent. solution dropped into the eye arresting the flow of tears for several minutes, thus enabling an easy examination.

Judiciously employed, alumol produces no injurious effects. Experiments on animals showed that very large doses were required to produce any toxic action consisting in changes in the kidneys such as are liable to follow the administration of excessive doses of aluminium salts generally.

Diaphterin (Oxyquinaseptol), a New Antiseptic. (*Pharm. Zeitung*, 1892, 429.) This substance, to which attention was directed by Prof. Emmerich as a most valuable and comparatively non-poisonous antiseptic, is formed by the introduction of a second molecule of oxyquinoline into oxyquinoline phenol sulphonate. Its composition is represented by the formula—



When recrystallized from water it forms amber-yellow, transparent, hexagonal crystals, which are freely soluble in water, but less soluble in alcohol. It fuses at 85°C., and begins to decompose when heated above 180°C. Its aqueous solution gives with

ferric chloride a bluish-green coloration which is destroyed by hydrochloric acid. When treated with an excess of sodium carbonate, oxyquinoline is precipitated, while phenol is found in solution.

A 1 per cent. solution is sufficiently strong for antiseptic dressings.

Formic Aldehyde as an Antiseptic. M. Berlioz and A. Trillat. (*Comptes Rendus*, cxv. 290; also *Pharm. Zeitung*, xxxviii. 173.) The authors' experiments afford additional evidence respecting the powerful antiseptic action of this body. A very small proportion suffices to arrest the development of bacteria and to prevent the putrefaction of animal substances. It is equal in this respect, if not superior, to corrosive sublimate, and has the advantage of being readily diffusible. It is stated that its vapour, when mixed with air, may be inhaled without producing any injurious effect. A solution containing 40 per cent. of the aldehyde is introduced as a very efficient general disinfecting agent and antiseptic under the name of "formalin." It is a colourless liquid of pungent odour, and can be easily assayed by titration with ammonia, rosolic acid being used as an indicator.

Formalin. J. Stahl. (*Pharm. Zeitung*, 1893, 173.) This name is given to a 40 per cent. aqueous solution of formaldehyde, which is used as a disinfectant in the form of solution, spray, or vapour. It is stated to be equal to solution of corrosive sublimate as a microbicide and to have the advantage of being non-poisonous.

Europen. Dr. Eichhoff. (*Medical Chronicle*, February, 1893, 331.) The author has further investigated the antiseptic and therapeutic properties of this body, and confirms its value as an efficient substitute for iodoform, over which it has the advantage of causing no injurious effects after absorption, and having no unpleasant odour (compare also *Year-Book of Pharmacy*, 1892, 199).

Antiseptics and their Classification. T. J. Keenan. (*American Druggist*, March, 1892.) The author divides antiseptics into three principal groups, indicative of their application, viz.:—

Surgical Antiseptics.—Agents capable of keeping sterile the exposed tissues and field of operation during the progress of a surgical performance, and of preserving afterwards the asepticity of the parts operated on.

Medical Antiseptics.—Drugs used in the treatment of intestinal sepsis, fermentation, etc., and in the treatment of parasitic diseases of the skin, etc.

Pharmaceutical Antiseptics.—Agents employed in the preservation of those organic chemical solutions, etc., that are liable to undergo decomposition from the development of fermentation, or of growths of a fungoid nature.

These he again subdivides into classes indicative of their derivation, namely, into chemical bodies of the *phenol*, *mercury*, and *iodine* classes, as follows :—

I. Antiseptic Drugs Classed According to their Uses.

1. *Surgical Antiseptics.*—Bichloride of mercury, red iodide of mercury, carbolic acid, cresol and its combinations, creolin, lysol, naphthalin and its combinations, thymol and its combinations, salicylic acid, boric acid, euophen, aristol, iodoform, dermatol, acetate of aluminium, permanganate of potassium, hydrogen dioxide, iodol.

2. *Medical Antiseptics.*—Salol, salicylic acid and its salts, nitrate of silver, creosote, naphthalin and its combinations, resorcin, bismuth and its combinations, benzoin and its combinations, euophen, aristol, iodoform, dermatol, camphor, sodium sulphite, zinc sulphite, potassium sulphite, oil of cinnamon, oil of fennel, oil of peppermint, oil of wintergreen.

3. *Pharmaceutical Antiseptics.*—Salicylic acid, acetanilid, chloroform, alcohol, glycerin, chloral, boric acid.

II. Antiseptic Drugs Classed According to their Derivation.

1. *Phenol Class.*—Carbolic acid, cresol, creolin, lysol, creosote, salicylic acid, salol, naphthalin, thymol, euophen, aristol, resorcin, benzoin, acetanilid, camphor, oil of cinnamon, oil of fennel, oil of peppermint, oil of wintergreen.

2. *Mercury Class.*—Bichloride of mercury, red iodide of mercury.

3. *Iodine Class.*—Iodoform, iodol.

4. *Unclassified.*—Nitrate of silver, bismuth combinations, dermatol, alcohol, glycerin, chloroform, chloral, sulphur combinations, acetate of aluminium, boric acid, permanganate of potassium, hydrogen dioxide.

Of the various chemical agents which have been proposed as substitutes for iodoform, the author considers euophen to be the most potent and least disagreeable.

Arsenic as a Prophylactic. C. F. Bryan. (*Brit. Med. Journ.*, 1892, 1187.) The author reports favourably on the value of arsenic as a prophylactic in scarlet fever, diphtheria, and influenza. It is given for this purpose in the form of pills containing $\frac{1}{80}$ to $\frac{1}{40}$ grain of arsenious acid, or in 2-minim doses of liquor arsenicalis.

Lithium Benzoate in Rheumatic Gout. M. Adone. (*Journ. de Pharm. et de Chim.*, October, 1892.) The author confirms the value of lithium benzoate in the treatment of rheumatic gout. He observed that its prolonged administration was followed by an almost entire disappearance of uric acid from the urine.

Magnesium Gynocardate as a Remedy for Leprosy. P. S. Abraham. (*Chemist and Druggist*, January 28th, 1893. From *Brit. Med. Journ.*) The author has applied this remedy for leprosy with better results than chaulmoogra oil as such. It seems that the magnesia salt agrees better than the oil, and that it is applicable with advantage in every case in which the oil is useful.

Potassium Dithiocarbonate as a Remedy in Skin Diseases. MM. Tommasoli and Vicini. (*Monatsch. für pract. Dermatol.*, 1892, 427. From *Pharm. Journ.*) This salt, the formula of which is $K_2CO_3S_2$, has been successfully used by the authors in various forms of skin disease as ointment, and also in water solution containing as much as 5 per cent. Stronger preparations are sometimes productive of unpleasant effects. The salt is an orange-red, crystalline and deliquescent powder, readily soluble in water, slightly in alcohol. It is prepared by the action of carbon bisulphide upon caustic potash solution at the boiling-point. The authors share the opinion of Unna that the efficacy of sulphur preparations is entirely due to the evolution of sulphuretted hydrogen, which is a result of their gradual decomposition.

Strontium Salts as Therapeutic Agents. (From *The Therapist*.) Strontium salts, though only recently introduced as medicinal agents (see *Year-Book of Pharmacy*, 1892, 192-193), appear to be rapidly increasing in favour, and are stated to have a decided antiputrescent and antiseptic power on the tissues and excreta. They are non-poisonous, provided they are perfectly free from barium. The nitrate is recommended in doses of 30 grains and upwards in articular rheumatism, the acetate as a tænicide, the phosphate as a substitute for calcium phosphate, and the iodide and bromide as substitutes for the corresponding potassium salts, over which they have the advantage of being borne in larger doses. The lactate, which has obtained a reputation in albuminuria, may be safely given in daily quantities of two and even up to three drachms.

Anti-Emetic Effects of Strontium Bromide. G. Coronedi. (*Répertoire de Pharm.*, October, 1892.) Very good results have been obtained by the author with strontium bromide in the treatment of persistent vomiting originating from various causes, in-

cluding pregnancy. It is administered in doses of 15 grains two or three times a day with meals.

Physiological Effects and Uses of Strontium Salts. A. Malbec. (*Revue internat. de Bibliogr. Méd.*, October 10th, 1892, 330; *Amer. Journ. Pharm.*, December, 1892.) The author states the adult dose of the *lactate* to be from 2 to 10 grains, while the *bromide* and *iodide* may be given in the same doses as the corresponding potassium salts; the *sulphate* and *phosphate*, being insoluble, may be given in wafers, or mixed with food, or preferably in the form of biscuits. The author finds the salts to be non-poisonous; they appear to facilitate the nutritive acts in the organism, more particularly the *lactate*; to sensibly augment the intravascular tension on the one hand, and on the other hand to retard the peptonization of the albuminoids, thus effecting a favourable action in certain pathological conditions. The author regards the *lactate* as being indicated in certain forms of albuminuria, and also in gastric affections, characterized by hyperpepsia with accompanying pain; it may even advantageously replace the alkali bicarbonates. *Bromide of strontium* is a substitute for potassium bromide, is better tolerated by the stomach, and does not cause the condition of bromism. *Strontium iodide* should be preferred to potassium iodide as a cardiac and circulatory medicament, in case the latter be not well tolerated. *Strontium nitrate* is found to be a good diuretic. *Strontium sulphate* and *phosphate*, notably the latter, may be utilized as antiseptics, antiparasitics, and restoratives.

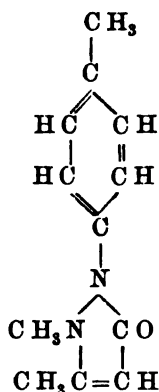
Names of New Remedies. J. D. Riedel. (*Chem. Centralbl.*, 1892, 584-586.) This paper furnishes a list of names under which a number of organic chemicals have been recently introduced as drugs.

Agathin, a New Remedy for Neuralgia and Rheumatism. (*Pharm. Zeitung*, 1892, 414.) The substance introduced under this name is stated to be a salicyl- α -methylphenylhydrazone of the formula $C_6H_4.OH.CH.N.N.(CH_3)C_6H_5$, and is described as forming greenish-white, inodorous and tasteless laminæ, melting at 72-74° C., insoluble in water, but soluble in alcohol, ether, and benzol. It is administered in doses from 2 to 7 grains two or three times daily.

Asbolin. A. Béhal and M. Desvignes. (*Comptes Rendus*, exiv. 1541.) The preparation introduced under this name as a remedial agent in tuberculosis was obtained by Braconnot from an aqueous infusion of soot. The authors have examined it, and

found it to consist of a mixture of *pyrocatechin* and *homopyrocatechin*.

Tolypyrrine and Tolysal. (*Pharm. Centralhalle*, xxxiii. 715.) The body recently introduced by J. D. Riedel under the name of "tolypyrrine" is *p*-tolylidimethylpyrazolon, and differs from antipyrine by containing an additional methyl group introduced into the phenyl radical. Its constitution is represented by the following formula :—



It is stated to possess valuable therapeutic properties. Like antipyrine, it combines with salicylic acid in a manner analogous to the formation of salipyrine. The resulting compound, $\text{C}_{12}\text{H}_{14}\text{N}_2\text{O} \cdot \text{C}_7\text{H}_6\text{O}_3$, is termed "tolysal," and is credited with remarkable therapeutic properties, respecting which a further account is promised.

Antispasmin. E. Merck. (*Pharm. Journ.*, 3rd series, xxiii. 606.) This is a preparation consisting of one molecule of narceine sodium combined with three molecules of sodium salicylate. The author describes it as a white, slightly hygroscopic powder readily soluble in water. It contains about 50 per cent. of narceine, has an alkaline reaction, and absorbs carbonic acid from the air with partial separation of narceine. It is considered that the purity of the narceine in this preparation, and its solubility, will remove some of the chief objections to the use of this base in medicine. It is found to be an excellent hypnotic and sedative, especially suited for the relief of cramp, and hence the name adopted for it. It may be administered without danger in doses of $\frac{1}{10}$ of a grain to $1\frac{1}{2}$ grains, and appears to be well adapted for use in the treatment of diseases of children.

Chloralose, a New Hypnotic. M. Hanriot and C. Richet. (*Comptes Rendus*, cxvi. 63-65.) Under this name the authors describe a substance resulting from the combination of chloral and glucose, which had previously been obtained in a somewhat less pure condition by A. Heffter, who called it "anhydroglucochloral" (see *Year-Book of Pharmacy*, 1890, 32). It is recommended as a hypnotic, more active than chloral, and quite free from injurious effects in doses not exceeding 12 grains. Its composition is represented by the formula $C_8H_{11}Cl_3O_6$. It is prepared by heating a mixture of equal quantities of anhydrous chloral and dry glucose to $100^\circ C$. for an hour, then mixing the cooled product with a small quantity of water and extracting with boiling ether. The ether solution is repeatedly distilled with water, until all the chloral has been expelled. The residual aqueous solution yields upon fractional crystallization two distinct bodies of the same composition, one of which is slightly soluble in cold water, but soluble in hot water and alcohol, and constitutes the substance under discussion (chloralose), while the second is almost insoluble even in hot water, and is distinguished by the name parachloralose, which is devoid of physiological activity.

Chloralose is much more active as a hypnotic than chloral, and its effects cannot, therefore, be due to the liberation of the latter. It has a strongly bitter taste, and is most conveniently administered in cachets.

Losophan, a New Remedy for Skin Diseases. E. Saalfeld. (*Pharm. Centralhalle*, 1892, 613. From *Therap. Monatshefte*.) The remedy introduced under this name is tri-iodo-meta-cresol, $C_6H_2I_3 \cdot CH_3 \cdot OH$, and is prepared by the action of iodine upon *m*-oxytoluic acid in the presence of the calculated quantity of alkaline hydrate or carbonate. It appears in the form of white needles, melting at $121.5^\circ C$., and containing about 80 per cent. of iodine. It dissolves with difficulty in alcohol, but readily in ether, chloroform, benzol, and fixed oils. A solution in strong alcohol remains unchanged on keeping. A one per cent. alcoholic solution, or an ointment containing 1-3 per cent., have been used successfully in the treatment of herpes tonsurans, pityriasis versicolor, and affections due to animal parasites, as well as in prurigo and some forms of chronic eczema, sycosis vulgaris, and acne.

Losophan is stated to be not adaptable for use in inflammatory conditions of the skin, as it is apt to cause irritation.

Gallanol, a New Remedy in Skin Diseases. M. Blanc. (*Revue de Thérap.*, lx. 214. From *Pharm. Journ.*) The author describes

this as a white crystalline compound, having a slightly bitter taste, and melting at 205°C . without decomposition. It is obtained by heating tannin with aniline, and treating the product with water acidified with hydrochloric acid, after which it forms crystals which can be purified by repeated crystallization from aqueous alcohol. The compound is only slightly soluble in cold water, very soluble in boiling water and in alcohol, soluble also in ether, but insoluble in benzine and chloroform. Alkalies dissolve it without sensible decomposition, but cause a brown coloration. In doses of two grams gallanol has no ill effect upon man, but it is chiefly indicated for external application. It causes no irritating effect upon the skin, to which it may be applied in the form of powder; has also been used with advantage in cases of psoriasis and eczema, in the form of a pomade with soft paraffin basis, containing one-twentieth, one-tenth, or even one-fourth of the medicament, and is said to be preferable to chrysophanic and pyrogalllic acids.

Thiosinamine. L. Hesse. (*Pharm. Journ.*, 3rd series, xxiii. 341-342. From *Apoth. Zeitung*.) This substance has recently been recommended by Hebra as useful in the treatment of lupus and some related diseases. It is allylsulphocarbamide, $\text{CS} \begin{smallmatrix} \text{N H} \\ \text{N H}_2 \end{smallmatrix} \text{C}_3\text{H}_5$, and is formed by warming mustard oil, $\text{C}_3\text{H}_5\text{NCS}$, with strong solution of ammonia. On evaporating the solution, thiosinamine crystallizes in colourless prisms. It is readily soluble in water, alcohol, or ether, has a faint alliaceous odour, bitter taste, and melts at 74°C . It is used in the form of injection, containing from 15 to 20 per cent. The author suggests that this preparation should be used with caution, as it is not free from toxic effects.

Thyroid Extract, its Preparation for the Treatment of Myxœdema. E. White. (*Pharm. Journ.*, 3rd series, xxiii. 321.) The hypodermic injection of a glycerin extract of the thyroid gland of sheep has been advocated as a remedy for myxœdema (see *British Medical Journal*, October 10th, 1891, and April 16th, 1892). An extract, prepared by the method given below, has been used with satisfactory results.

The glands are best obtained at the slaughter-house when sheep are being killed. The operator should be provided with a scalpel, a pair of forceps, and a stoppered bottle, all of which should be thoroughly cleansed and rinsed with 5 per cent. aqueous

solution of carbolic acid. As soon as the sheep is dead, the skin is removed from the neck, and while the animal is lying on its back, a median incision is made, extending from beneath the chin nearly to the breast, so as to expose the trachea. The thyroid consists of two lobes, situated in the upper part of the neck, one on each side of the trachea, and connected by a narrow bridge or isthmus. This isthmus is about one-eighth of an inch broad, and is seen running across the trachea just below the larynx, on about the third or fourth cartilage ring. It is reddish in colour, but sometimes very pale. Tracing it round on either side of the trachea, the two lobes are easily found. Each lobe is from 1-1½ inches long, about ¾-inch broad, shaped like an almond, and of firm and compact texture. The colour is dark red. The lobes are removed by means of the forceps and scalpel, as free as possible from the surrounding connective tissue, and transferred at once to the bottle.

To prepare the extract, the glands are cut up into transverse slices on a clean glass or earthenware plate which has been rinsed in 5 per cent. carbolic acid solution. All the utensils employed in the subsequent operations should be rinsed in the same fluid. The sliced glands are placed in a mortar with some ordinary glass tubing—about two inches to each pair of glands will be found sufficient. The whole is ground up together until the glands are thoroughly disintegrated, and a mixture is then added of equal parts of glycerin and water in the proportion of one fluid drachm to each pair of glands. The mixture of glycerin and water should be first sterilized by boiling for a few minutes, and then cooled. After well trituration, the contents of the mortar are transferred to a stoppered bottle or jar, a small piece of thymol is added, and the whole macerated for twenty-four hours. At the expiration of this period, the fluid is squeezed out through a piece of muslin by means of the fingers (previously dipped into 5 per cent. carbolic acid solution), and filtered through a double layer of paper under pressure. The paper may be sterilized by immersion in boiling water. Under a pressure equal to about 15 inches of mercury a nearly clear filtrate of a pale red colour is obtained, measuring about the same volume as the fluid added to the glands, since the glands themselves exude fluid when pounded in the mortar, and by filtering under pressure very little fluid is lost in the residue remaining on the filter.

If access cannot be had to a pressure-filter, it suffices to pour off the supernatant fluid after the twenty-four hours' maceration,

because filtration under ordinary conditions proceeds too slowly. In this case much less extract is obtained, but this defect can be partly remedied by using double the quantity of glycerin and water given above. This will give a distinct layer of fluid, which can be easily decanted from the residue. Care should be taken to see that it is free from solid particles of all but the minutest size. Fifteen minims of the stronger or thirty minims of the weaker extract is the quantity employed for each injection. The extract may be kept about seven days in a well-stoppered bottle containing a piece of thymol. After this time its injection is followed by some local disturbance, due probably to incipient putrefactive decomposition, which the thymol seems incapable of preventing. Whether the addition of any other antiseptic, of harmless nature, would obviate this effect, has not yet been determined.

Note on Thyroid Extract. Dr. Mackenzie. (*Brit. Med. Journ.*, October 29th, 1892.) The author's experiments show that the administration of thyroid extract by the mouth produces the same result as the administration by means of hypodermic injection.

The Active Principle of the Thyroid. E. White. (*Pharm. Journ.*, 3rd series, xxiii. 651-652.) The process suggested by the author for the preparation of this principle in a dry state, consists in acidifying a diluted glycerine extract of the glands with phosphoric acid, and then precipitating with calcium hydrate, which carries down the whole of the as yet unidentified principle, and is itself precipitated as calcium phosphate, leaving a clear supernatant fluid. The precipitate when dried is non-hygroscopic, tasteless, and odourless, and appears to possess a similar activity to the better known preparations already in use. The powder is administered in three-grain doses, and, in one instance, has caused a reduction in bulk of fourteen pounds in a month. It is stated to be free from all the objectionable features attending ingestion of the glands themselves, and, in its manufacture, the various special precautions necessitated in the preparation of extracts for hypodermic injection are obviated.

Animal Extracts. E. Delpech. (*Pharm. Journ.* From a paper read before the *Société de Pharmacie de Paris.*) The solutions obtained from animal tissues, according to the methods of Brown-Séquard, d'Arsonval, and Constantin Paul, are intended, according to their nature, to be used for the treatment of anæmia, nervous debility, tuberculosis, neurasthenia, goitre, total ablation of the

thyroid gland, myxœdema, diabetes, leucocythæmia, degeneration of the suprarenal capsules, and Addison's disease.

Cerebral Extract.—The extract from the brain of the sheep is prepared according to the method of Dr. Constantin Paul, which is described by him as follows:—From the brain of a recently killed sheep, fifteen grammes of the grey matter are taken and divided into small pieces. These are allowed to macerate for twenty-four hours in five times their weight of glycerin. Then add an equal weight (75 grammes) of a two per cent. salt solution. Filter through paper by the aid of a pressure-filter, into a vessel that has been sterilized in Pasteur's apparatus at 140° C. Next introduce the solution into the sterilizing filter apparatus of d'Arsonval, and submit it to a pressure of fifty to sixty atmospheres, obtaining this pressure by allowing liquid carbon dioxide to pass into the gaseous state. After leaving it in contact with the gas for fifteen minutes, filtration is then allowed to proceed through the clay cylinder in the apparatus, the same pressure being maintained. In this rapid filtration of the fluid in d'Arsonval's apparatus, the carbon dioxide protects the liquid from contact with the air, and on the other hand submits it to a preliminary sterilization which may be called physiological, independent of the purely physical sterilization due to the action of the clay cylinder. The action of the carbon dioxide is to destroy all organisms present in the fluid, and, by the pressure exerted, this is afterwards forced through the clay cylinder. The liquid thus obtained is of uniform composition and physiological activity, for the carbon dioxide may be regarded as the natural medium surrounding the histological elements of the animal tissues, since the lymph which constitutes the actual medium is saturated with this gas and contains but little oxygen. The use of carbon dioxide then is not likely to have any deleterious effect on the organic fluids dealt with. Immediately after filtration the liquid froths, owing to disengagement of the gas. It ought speedily to become limpid and transparent, and have somewhat the syrupy consistence of glycerin, its density being from 1·08 to 1·09, and its reaction neutral. It contains no organized bodies, and is composed of albuminoid matter, phosphorus in the form of glycerophosphoric acid, cerebrin, and lecithin, ten parts containing the soluble portion of one part of the grey matter of the sheep's brain. On the filtrate leaving the apparatus, it is received directly into stoppered bottles, having a capacity of about ten cubic centimetres, which have been rendered perfectly aseptic in Pasteur's apparatus at a

temperature of 140° C. It must afterwards be protected from air, light, and heat. Dr. Constantin Paul recommends that the solution should be employed within ten days of its preparation, as after that time it may have become altered or have lost its efficacy. The dose, by injection, is one to five cubic centimetres twice or thrice during the week.

Testicle Extract.—The extract from the testicles of the ram is prepared by the method of Brown-Séquard and d'Arsonval. One hundred grams of the material, which must be perfectly fresh, are divided by scissors into small pieces, and macerated in an equal weight of glycerin for twenty-four hours, when a similar weight of a boiled five per cent. salt solution is added. Filter through *papier Laurent* by the aid of a pressure-filter, then through a clay cylinder in d'Arsonval's apparatus under a pressure of sixty atmospheres, after remaining in contact with the carbon dioxide for fifteen minutes. It is received into sterilized stoppered bottles like the former extract.

Thyroid Extract.—To prepare the extract from the thyroid glands of sheep, the organs are freed from enveloping tissues, fifteen grams of the substance are then cut in small pieces with scissors and bruised in a mortar with sand and fifteen grams of five per cent. salt solution. Next add thirty grams of glycerin, macerate for twenty-four hours, add a similar weight of boiled salt solution, filter through paper under pressure, then in d'Arsonval's apparatus, and receive the filtered fluid in sterilized stoppered bottles as before.

During the course of the preceding operations, it is absolutely necessary that all instruments and vessels should be perfectly sterilized before use.

Acetic Acid as a Menstruum in the Preparation of Medicinal Extracts. F. Hoffmann. (*Pharm. Rundschau*, 1893, No. 2.) The author suggests a menstruum of 60 per cent. of acetic acid in the place of weak or strong alcohol for the exhaustion of drugs, especially for those rich in essential oils, aromatic resins, alkaloids, or glucosides. The acetic acid is recovered by distillation. He considers this mode of extraction as more complete and as yielding products of greater strength and constancy.

The Fluid Extracts of Cinchona and Erythroxyton. J. P. Remington. (From *Proc. Amer. Pharm. Assoc.*, 1892.) The author finds that the best menstruum for the preparation of liquid extract of cinchona is a mixture of four volumes of alcohol and one of glycerin, the percolation being subsequently completed with a

mixture of four volumes of alcohol and one of water. The product thus obtained showed no signs of precipitation after being kept for six months at a low temperature.

In the case of liquid extract of erythroxylon, the best results were obtained with a menstruum composed of one volume of alcohol and two volumes of water.

Report on some Pharmacopœial Extracts. R. A. Cripps. (*Chemist and Druggist*, March 18th, 1893, 383.) *Extractum Mezerei Æthereum*.—Having repeatedly met with samples of this extract imperfectly soluble in rectified spirit, the author has examined several trade samples from different makers with the following results:—

No. of sample.	Colour.	Moisture per cent.	Sol. in S. V. R. per cent.	Sol. in ether per cent.	Sol. in S. V. R. per cent. after cuber.	Insol. in ether or S. V. R.
1	Sap. green	7·7	91·5	90·55	2·15	nil
2	Sap. green	13·1	82·0	70·8	16·0	nil
3	Dull green	11·15	87·5	84·3	2·6	large traces
4	Brown	9·3	87·0	46·0	44·4	mere trace
5	Dirty yellowish-green .	13·3	77·5	75·8	11·5	mere trace
6	Deep sap. green	12·3	74·5	87·0	1·0	nil
7	Sap. green	9·2	89·2	83·2	8·7	nil
8	Dirty yellowish-green .	8·9	86·4	86·2	5·2	nil

Samples Nos. 7 and 8 were specially prepared from the stem and root barks respectively. The yield from the latter was rather greater than from the former, but the colour was very unsatisfactory. From these results the author concludes that No. 5 was prepared from the root bark; that No. 4 was not evaporated far enough before the ether was added, and was consequently an ethereo-alcoholic rather than an ethereal extract (a conclusion applying also to some extent to Nos. 2 and 5); and that the other samples, though presenting some variation, are satisfactory. As a practical suggestion he recommends every pharmacist to make a trial of the solubility of this extract in ether before receiving it into stock.

Extractum Jalapæ.—With a view to determine how far the extract of jalap of English trade represents the official preparation, the author obtained and examined seven samples from various wholesale houses. The following results were obtained:—

No of sample.	Appearance.	Total resin per cent.	Resin sol. in ether.
1	Very resinous ; firm consistence . . .	50.1	7.0
2	Resinous ; hard	40.5	6.7
3	Moderately resinous ; fair consistence .	32.7	6.3
4	Moderately resinous ; soft consistence .	2.5	0.3
5	Sticky and soft consistence	18.0	8.3
6	Sticky and very soft consistence . . .	12.0	5.8
7	Moderately resinous ; good consistence	18.4	2.8

The extraordinary variation thus indicated in the strength of the commercial extract, together with the impossibility of determining the value of the extract by any method, short of actual assay (differing in this respect materially from resin of jalap, the quality of which is readily ascertained by simple solubility tests), lead the author to the conclusion that jalap extract is an unreliable preparation unless standardized, and that it might without disadvantage be expunged from future editions of the Pharmacopœia, as the resin seems to answer all requirements.

Extract of Conium.—An examination of seven commercial specimens of this extract yielded the results shown in the following table:—

No. of sample.	Colour.	Consistence, etc.	Moisture.	Ash.	Alkaloidal hydrochlorates.
1	Greenish brown, 5th	Very stiff, smooth . .	32.4	16.5	0.44
2	Brownish green, 2nd	Rather stiff, granular .	30.0	18.5	0.39
3	Greenish brown, 4th	Rather stiff, slightly granular	31.7	22.15	0.18
4	Brownish green, 3rd	Soft, very smooth . .	31.8	15.3	0.23
5	Brown, 7th	Stiff, very granular .	26.4	23.0	0.37
6	Greenish brown, 6th	Soft, rather granular .	32.1	16.0	0.09
7	Green, 1st	Rather stiff, granular .	24.1	17.3	0.28

The amount of alkaloid present is thus shown to be extremely variable, the weakest sample being barely one-fifth as strong as the most potent. The author proposes that this extract should be removed from official recognition, and considers that its place might well be supplied by recently powdered conium fruits (which are capable of ready assay and contain about double the quantity of

alkaloids), or by a fluid extract made from the fruits by re-percolation, which could be standardized to contain 0.5 per cent. of alkaloid, and be made into pills with the aid of a dry excipient. He considers that any preparation which entails evaporation, unless in strongly acid liquids, would be undesirable, and the use of acids is to be deprecated.

The Assay of Narcotic Extracts. A. Partheil. (*Apotheker Zeitung*, vii. 435.) The author states that in the examination of narcotic extracts by the method of Beckurts or Dieterich, with subsequent titration of the alkaloid with centinormal potash, the best indicator is a solution of 2 milligrams of iodoeosin per litre of ether. The liquid to be tested is shaken with 20 c.c. of this indicator and gradual successive additions of the standardized alkali, until the aqueous solution becomes rose-coloured. The ether layer itself remains almost colourless. Quinine cannot be titrated with this indicator; but the method answers well with strychnine, brucine, aconitine, coniine, morphine, cytisine, and the solanaceous bases.

Examination of Commercial Specimens of Liquid Extract of Ergot. W. B. Cowie. (*Chemist and Druggist*, April 1st, 1893, 441.) The following results were obtained by the author in the examination of a number of trade specimens of this extract:—

Sample.	Specific gravity.	Per cent. extractive.	S. V. R. by vol.	Copper.
Standard . .	1.038	14.85	29.76	—
A	1.031	15.08	32.94	absent
B	1.018	11.77	32.91	present
C	1.025	12.80	33.50	absent
D	1.040	14.90	24.70	absent
E	1.040	15.40	25.00	present
F	1.016	8.12	16.28	present
G	1.062	17.47	12.80	absent
H	1.020	11.67	29.89	present
Average . .	1.032	13.41	25.43	

The author states that it would be an advantage, in the case of an important preparation of this kind, to have such character and tests introduced into the Pharmacopœia as would secure the attainment of a reasonable standard of uniformity. For this purpose they suggest the following:—Liquid extract of ergot should be a bright liquid of a rich reddish-brown colour, having a specific gravity of 1.030 to 1.040, yielding at 105° C. 12 to 14 per cent. of

extractive, readily soluble in warm water, and containing 29 to 30 per cent. by volume of rectified spirit.

Standardization of the Official Belladonna Preparations. J. Barclay. (*Pharm. Journ.*, 3rd series, xxiii. 740-742; *Chemist and Druggist*, February 25th, 1893.) The author publishes analyses of commercial specimens of green extract of belladonna showing a very considerable variation in alcoholic strength. These results, together with those respecting other belladonna preparations previously published by Dunstan and Ransom, Cowie, and Cripps, leave no doubt on his mind for the necessity of standardization of all the preparations of this drug. Dunstan and Ransom have recommended a dry alcoholic extract containing 2 per cent. of total alkaloid, while Cowie has suggested a 4 per cent. strength. The author considers the former too low and the latter too high, and expresses himself in favour of the adoption of a 3 per cent. standard for the alcoholic extract. He suggests that the green extract be eliminated from the Pharmacopœia; but as an extract weaker than the alcoholic is desirable for dispensing, he proposes the substitution for the green extract of a powdered extract containing one per cent. of total alkaloid.

With regard to the strength of the tincture, the author considers that the standard of .025 of total alkaloid recommended by Farr and Wright seems to meet with general approval. As to the liniment, he suggests .25 as a convenient strength; it would thus be 10 times as strong as the tincture, and fairly approximate the strength of the present official liniment. He proposes the following directions for producing the various belladonna preparations on the lines indicated:—

Stronger Extract of Belladonna.

Take of—

Belladonna Root in No. 40 powder . . .	1 pound.
Rectified Spirit . . .	.75 fluid ounces.
Distilled Water . . .	a sufficiency.

Macerate the belladonna in 50 fluid ounces of the spirit for forty-eight hours; transfer to a percolator, and when the fluid has ceased to pass continue percolation with 25 fluid ounces, or a sufficient quantity of a mixture of equal parts of rectified spirit and water until 50 fluid ounces of percolate are collected, recover the spirit from the extract by distillation, evaporate the residue to form an extract. Continue now to percolate the root with an additional 25 fluid ounces, or a further sufficient quantity of

the diluted spirit until a further 20 fluid ounces of percolate are obtained; recover the spirit from this portion by distillation, and evaporate the residue to form an extract. The spirit remaining in the marc may be recovered by any convenient method.

Determine the amount of alkaloid contained in the first portion of extract obtained and in the second portion; to the first portion of extract add a sufficient quantity of the second to produce an extract containing 3 per cent. of total alkaloid. Preserve what remains of the second portion of extract for preparing Extract of Belladonna.

Extract of Belladonna.

Take of—

The second weaker portion of extract obtained in preparing the stronger Extract of Belladonna	}	any convenient quantity.
Stronger Extract of Belladonna		
		a sufficient quantity.

Mix the extracts in such proportions as to produce a mixture containing 1 per cent. of total alkaloid. Remove water by exposure to the heat of a water-bath, reduce to powder, and to the powder add a quantity of sugar of milk equal in weight to the water removed.

Tincture of Belladonna.

Take of—

Stronger Extract of Belladonna	. . .	78 grains.
Proof Spirit	. . . . .	1 pint.

Dissolve the extract in the spirit, allow any undissolved matter to subside, and decant the clear tincture, which should measure 20 fluid ounces.

One hundred fluid parts of the tincture contain '025 parts, by weight, of total alkaloid.

Liniment of Belladonna.

Take of—

Stronger Extract of Belladonna	. . .	1,095 grains.
Camphor	. . . . .	1 ounce.
Rectified Spirit	. . . . .	30 fluid ounces.

Dissolve the extract and camphor in the spirit, allow any undissolved matter to subside, and decant the clear liquid, which should measure 30 fluid ounces.

One hundred fluid parts of the liniment contain .25 parts, by weight, of total alkaloid.

Tincture of Green Hellebore. E. H. Farr and R. Wright. (*Chemist and Druggist*, October 29th, 1892.) The authors' experiments indicate that the use of a menstruum containing 70 per cent. of alcohol, and the application of a process of continuous percolation, are best adapted for the preparation of this tincture.

The yield of alkaloid by tinctures prepared from different specimens of the drug was found to vary between the extreme limits of .032 and .220, thus proving the urgent need for the adoption of a definite process for the preparation of this tincture, and the application of such tests to the finished product as may insure constancy and uniformity in strength. Details as to the mode of testing are given in the paper.

Tincture of Opium. E. H. Farr and R. Wright. (*Chemist and Druggist*, January 21st and March 4th, 1893.) The authors' results show that in the preparation of this tincture by the B.P. process, the exhaustion of opium rich in morphine cannot be effected even approximately, and that the product cannot therefore contain the theoretical quantity of morphine deducible by calculation from the amount actually present in the opium used. In order to obtain a tincture containing the standard percentage of morphine,—viz., .75 per cent.,—it would be necessary to employ opium containing at least 12.5 per cent. of this alkaloid, if the Pharmacopœia directions be strictly adhered to. At the same time the authors show that this standard may be maintained, provided the Pharmacopœia process is modified so that the opium is not used in the dry state. They recommend that the *moist* drug should undergo a preliminary treatment by rubbing it up with cold water, and that afterwards spirit should be added to make the menstruum of proof strength, and the mixture allowed to macerate for several days with frequent shaking.

Tincture of Lobelia. E. H. Farr and R. Wright. (*Chemist and Druggist*, April 1st, 1893.) The authors recommend an alcoholic menstruum of 50 per cent., and the process of continued percolation for the preparation of this tincture. The product thus prepared contains, on an average, 2.35 per cent. of extractive and 0.038 per cent. of lobeline.

Tincture of Rhubarb. W. Warrington. (*Western Druggist*, xiv. 325.) The author recommends the addition of 10 per cent. of glycerin to this tincture. He claims that by this means

precipitation is prevented and the tincture rendered more permanent.

Concentrated Tinctures and Infusions. E. Gane. (*Chemist and Druggist*, November 19th, 1892.) The author strongly condemns the use of these preparations, and as to the infusions, questions the correctness of their strength. The methods of manufacturing them are:—(1) By cold maceration and evaporation of the resulting liquor; (2) infusion in hot water, and pressure; (3) by percolation with cold water or dilute spirit. In the first process there are two drawbacks; viz., loss of aroma and decomposition of the active principles by the long evaporation. In the second process the product is always far stronger, when diluted as directed, than the B.P. preparation. The third process yields a better article, but still not a B.P. one; for very little of the mucilaginous matter is extracted by cold percolation; and when weak spirit is used, a kind of tincture, not an infusion, is obtained. The author also refers to R. A. Cripps' experience of inf. cinch. conc., which, when made by the prolonged evaporation method, always contains an excess of extractive matter and no quinine (on account of hydrolysis). Concentrated tinctures he places on the same level with concentrated infusions, and considers that in some cases it is impossible to make such preparations.

Preservation of Infusion of Digitalis. J. W. England. (*Amer. Journ. Pharm.*, 1892, 361.) The author suggests the addition of a small proportion of solution of ammonia to infusion of digitalis as a preservative. With this addition the infusion is said to keep unchanged for weeks, while otherwise decomposition would set in within three or four days.

Gelatinization of Infusion of Digitalis. W. Bräutigam. (*Pharm. Centralhalle*, 1892, 534.) The author has previously observed that the gelatinization of this infusion is due to the action of a micro-organism, *Micrococcus gelatinogenus*, upon cane sugar (see *Year-Book of Pharmacy*, 1892, 222). He now reports that the products produced in this action are dextran, dextrose, and levulose. The last is used as food by the organism, while the first is the cause of the gelatinization referred to. By precipitation with alcohol, dextran can be separated from the other products, and is thus obtained in the form of white flakes, which, on exposure to a gentle heat, dry up to a greenish-white, amorphous mass. Its aqueous solution is almost tasteless and strongly dextrogyre. On boiling with dilute acids it is converted into dextrose.

Note on the Decoction and Acid Infusion of Cinchona. I. W.

Thomson. (*Chemist and Druggist*, April 1st, 1893, 441; *Pharm. Journ.*, 3rd series, xxiii. 841.) The results of the author's experiments, in all of which the same sample of bark was employed, are tabulated as follows :—

	Per cent. total alkaloids.	Per cent. quinine and cinchonidine.
Bark contained.	6.20	4.05
B.P. infusion	4.94	1.91
Loss	1.26	2.14
Cold infusion for two hours	4.16	1.35
Loss	2.04	2.70
B.P. decoction	3.47	1.41
Loss	2.73	2.64

Hence it follows that in the case of the B.P. infusion there is a loss of 20.3 per cent. of the total alkaloids, and a loss of 52.63 per cent. of the quinine and cinchonidine; in the case of the cold infusion there is a loss of 32.9 per cent. of the total alkaloids, and a loss of 66.3 per cent. of quinine and cinchonidine; and in the case of the decoction there is a loss of 44 per cent. of the total alkaloids, and a loss of 65.6 per cent. of quinine and cinchonidine.

Assay of Aromatic Waters. F. Ranwez. (*Journ. de Pharm. d'Anvers*, December, 1892.) The author recommends the following process for the estimation of volatile oils in aromatic waters:—Dissolve 60 grams of sodium chloride in 200 c.c. of the aromatic water to be tested, shake the solution with 40 c.c. of rectified ether, separate the latter, and repeat this treatment with another 40 c.c., and finally with 20 c.c. of ether. Treat the united ethereal solutions with dry calcium chloride, and filter the decanted ether into an Erlenmeyer flask containing 5 c.c. of olive oil which has been previously dried at 100° C. and weighed (with the olive oil). Now remove the greater part of the ether slowly by distillation below its boiling-point, then place the flask in a drying oven at a temperature of 35–40° C., and aid the evaporation by drawing a current of air through the flask for a short time until the odour of ether has disappeared and the weight of the flask has become constant. By deducting from this weight the previous weight of the flask and olive oil, and multiplying the difference by five, the proportion of volatile oil per litre of aromatic water is obtained.

Liquor Magnesii Carbonatis. G. Lunan. (*Chemist and Druggist*, January 21st, 1893, 72.) Analyses of trade specimens of this preparation carried out by the author show greater uniformity in

nature and strength than those examined by others many years ago, though they still fall rather short of the requirements of the Pharmacopœia. With regard to the preservation of this liquid, he suggests the addition of 5 per cent. of glycerin and the storing in bottles holding only 4 or, at most, 6 ounces.

The Preservation of Spiritus Ætheris Nitrosi. A. Meldrum. (*Chemist and Druggist*, February 18th, 1893.) The author's experiments lead to the conclusion that the addition of 10 per cent. of glycerin to this preparation increases its stability very considerably. It prevents, to a great extent, the loss of ethyl nitrite, retards the formation of acetic acid and free nitrous acid, and reduces the percentage of aldehyde.

Syrup of Calcium Lactophosphate. H. W. Aufmwasser. (*Amer. Journ. Pharm.*, August, 1892.) The author gives the following directions for the preparation of this syrup:—Dissolve 21·3 parts of calcium carbonate in a mixture of 109·4 parts of phosphoric acid and 33 parts of lactic acid previously diluted with 80 parts of orange-flower water and 150 parts of distilled water, filter and wash the residue with sufficient water to obtain 400 parts of filtrate, in which dissolve 600 parts of sugar.

Syrupus Glycyrrhizæ. O. Linde. (*Pharm. Centralhalle*, 1892, 531.) The author points out that this syrup must vary in quality according to the proportion of glycyrrhizin contained in the root employed. He therefore suggests that this syrup be made by dissolving 4 parts of ammoniated glycyrrhizin in a mixture of 4 parts of alcohol and 26 parts of water, and adding this solution to 166 parts of simple syrup. In order to obtain the ammoniated glycyrrhizin, the finely cut liquorice root is extracted with cold water, the liquid boiled, filtered, concentrated, precipitated with an excess of dilute sulphuric acid, the precipitate washed, dissolved in the least possible quantity of solution of ammonia, and the solution evaporated upon plates at a moderate temperature.

Syrupus Granati Corticis. E. Aweng. (*Journ. de Pharm. Els.-Lothr.*, 1892, 209. From *Amer. Journ. Pharm.*) 100 grams of the finely powdered bark are boiled for one hour with dilute alcohol, sp. gr. 0·892, using a reflux condenser; after cooling, the drug is exhausted with dilute alcohol, and the percolate, after the addition of 60 grams of sugar, is evaporated on a water-bath to 100 grams. Alkaloidal assays of this preparation freshly made and after the expiration of two years gave almost identical results. The precipitate produced upon standing contained no alkaloid, but appeared to consist almost entirely of tannin. Owing to the deterioration

of the dried bark and the stability of the syrup, it is suggested that the syrup be made in such places as abound in the production of the drug. The presence of 23 per cent. of tannin in the bark imparts to the syrup an unpleasant, astringent taste; endeavours to manufacture a more palatable preparation led to the following formula:—The powdered bark is digested with the necessary quantity of water for twelve hours in a water-bath; after cooling 50 per cent. of slaked lime is incorporated, allowed to stand again for twelve hours, mixed with 4 or 5 volumes of alcohol, sp. gr. 0·830, strained and expressed. The percolate is slightly acidified with dilute sulphuric acid, filtered and distilled; there remains an almost pure solution of the alkaloidal sulphates, in which the alkaloids are determined, and the preparation is finished by adding sugar and a small quantity of the syrup according to the first formula, by means of which sufficient tannin is introduced to form the more stable tannate of the alkaloids. Of a syrup containing 1 per cent. of the alkaloidal sulphates, thirty grams constitute a dose, best administered in an emulsion of thirty grams of castor oil. The alkaloids are determined as follows:—The solution of the sulphates, freed from alcohol, is mixed with a slight excess of milk of lime; after an hour, 300 c.c. of petroleum ether (boiling-point 45° C.) are thoroughly agitated with the mixture, allowed to stand, and the petroleum ether removed as completely as possible, mixed with 50 c.c. $\frac{N}{10}$ of sulphuric acid, the solvent recovered by distillation, used again in the extraction of alkaloid, etc., until the alkaloids have been completely extracted; after the removal of the solvent the excess of acid is titrated with $\frac{N}{10}$ potassium hydrate. Each c.c. of the $\frac{N}{10}$ sulphuric acid neutralized by the alkaloids corresponds to 0·02 gram of alkaloidal sulphate. The alkaloids in the syrup can only be estimated after precipitating the sugar with an excess of alcohol.

The Cause of Crystallization in Easton's Syrup, B.P.C. W. Lyon. (*Pharm. Journ.*, 3rd series, xxiii. 795–797.) The author has investigated the causes favouring the deposition of a crystalline quinine salt, to which this syrup is known to be liable, and the means for preventing such crystallization. The points deduced from his experiments are:—

I. That whether the sugar does or does not cause crystallization, a large excess of acid undoubtedly does.

II. That by reducing the percentage of free acid there is a corresponding reduction in the tendency of the syrup to crystallize.

III. That by using a syrup of phosphate of iron containing 6.25 per cent. of free acid, an Easton's syrup can be made that will keep at ordinary temperatures for a reasonable length of time without depositing, undergoing discoloration, or crystallizing.

IV. That the quinine phosphate which gives the best results, and which is recommended for making Easton's syrup, is the one answering to the formula $(C_{20}H_{24}N_2O_2)_3 \cdot 2H_3PO_4 \cdot 6H_2O$, which is easily obtainable in this country.

The author adds the following directions:—

Syrup of Phosphate of Iron.

Take of—

Pure Iron Wire (polished)	360 grains.
Concentrated Phosphoric Acid (sp. gr. 1.5)	6 fluid ounces and 463 minims.
Distilled Water	4 fluid ozs.

Place in a flask, the mouth of which is plugged with cotton wool, and put in a warm place until dissolved, then filter into 72 fluid ounces of syrup (cold), and add sufficient distilled water to make the final product 96 fluid ounces.

Syrup of Phosphate of Iron with Quinine and Strychnine.

Take of—

Strychnine	5 grains.
Phosphate of Quinine	
$(C_{20}H_{24}N_2O_2)_3 \cdot 2H_3PO_4 \cdot 6H_2O$	120 „
Concentrated Phosphoric Acid (sp. gr. 1.5)	75 minims.
Distilled Water	225 „

Dissolve and add—

Syrup of Phosphate of Iron to produce 20 fluid ozs.

Note on Easton's Syrup. W. Martindale. (*Pharm. Journ.*, 3rd series, xxiii. 797-798.) Referring to the liability of this syrup to the separation of crystals, and the causes thereof, the author arrives at the conclusion that the quantity of water is insufficient to hold the quinine salt in solution, if the syrup contain the full quantity of sugar, and be exposed to a low temperature. He considers this the prime factor, but admits that the greater purity of the quinine may also have something to do with its crystallization in this syrup.

Note on the Crystallization in Easton's Syrup. P. W. Squire. (*Chemist and Druggist*, March 25th, 1893.) The author states that sugar greatly lessens the solubility of the quinine phosphate in the acid liquid, but that irrespective of this it may be expected

that (1) a preparation made according to the B.P.C. formula, and using the *syrupus ferri phosphatis* of the B.P., may be quite permanent; (2) if the acidity be reduced (to a certain point), the tendency to crystallize will be increased; (3) a further reduction in the quantity of acid will result in a syrup which will keep well, and be free from the excessive acidity inseparable from the use of the B.P.C. formula.

Solutions of Medicinal Resins. H. Wyatt, junr. (*Chemist and Druggist*, October 29th, 1892, 653.) 384 grains of jalapin (insoluble in ether) were mixed with 3 ounces of strong solution of ammonia, and occasionally shaken during two days. The resulting solution was placed in a water-bath, 2 ounces of glycerin added, and the whole evaporated with constant stirring until ammoniacal fumes were no longer given off. The liquid was made up, when cold, to 8 fluid ounces with glycerin. On trial in the wards of the Liverpool Royal Infirmary, this preparation was found to be both active and reliable. Subsequently a series of solutions containing, respectively, resin of scammony, podophyllin, and aloin, was made in a similar way. All of these proved satisfactory. Guaiacum resin gave a solution which deposited considerably on standing, and the supernatant liquid, doubtless ammonium guaiacate, was found useful as an addition to gargles and gelatine throat pastilles.

It is suggested that the method described is capable of extended application in making liquid preparations of drugs owing their activity wholly or in part to resins or resinoid bodies, such, for instance, as *cascara sagrada* and *podophyllum*.

A New Pill Excipient. M. P. Carles. (*Bull. Soc. Pharm. de Bordeaux*, xxxiii. 77.) The author proposes an intimate mixture of two parts of kaolin, one part of anhydrous sodium sulphate, and one part of water, as an efficient substitute for kaolin ointment, to which it is found superior on account of its more certain disintegration in the stomach. It is stated that potassium permanganate, silver nitrate, iodides of mercury, and similar preparations can be preserved unchanged in pill form by means of this excipient for long periods, and yet are liberated in the course of one minute when such pills are treated with water.

Pilula Ipecacuanhæ cum Scilla. R. Wood. (*Chemist and Druggist*, May 6th, 1893, 619.) Owing to the hygroscopic nature of powdered squill, the absence of an absorbent vegetable powder, and the unsuitability of treacle as an excipient, these pills are liable to become soft and sticky on keeping. To remedy this,

the author proposes to replace the treacle in the official formula by 1 oz. of powdered liquorice root and a sufficient quantity of fluid extract of liquorice. The result is stated to be very satisfactory.

Mercurial Ointment. H. Borntraeger. (*Pharm. Post.*, 1892, 1245.) By thoroughly triturating mercury with oleate of mercury, an intimate mixture can be obtained containing as much as 98 per cent. of the metal. From such a mixture the ordinary mercurial ointment may be readily prepared at any time by adding the requisite proportion of lard.

Assay of Mercurial Ointment. F. Boyeldieu. (*L'Union Pharmaceutique*, October 15th, 1892, 432.) 10 grams of the ointment are saponified with a solution of caustic soda and weak alcohol. After settling, the soap solution is decanted, the deposit again boiled with the same alkaline spirituous liquid, then washed with alcohol and finally with ether. The mercury thus obtained is dried with filter paper and weighed.

Preparation of Mercurial Soaps for Medicinal Use. C. Micko. (*Oesterr. Zeitschr. für Pharm.*, 1892, 354 and 372; *Amer. Journ. Pharm.*, September, 1892.) Satisfactory preparations are obtained by first separating the fatty acids from the fat and oils, and then warming them with yellow mercuric oxide. No reduction of mercury takes place in the process. The fats are saponified in the usual manner, and the fatty acids liberated from the alkali-soaps by adding hydrochloric acid; after boiling the fatty acids with several portions of water to remove mineral acid, they are transferred to a capsule and dried in an air-bath. To determine the necessary mercuric oxide, about two grams of the acid are titrated with $\frac{2}{3}$ alkali, using phenolphthaleïn as indicator (for most purposes the oxide necessary can be calculated if the average molecular weight of the fatty acids is known, this requiring 108 parts of mercuric oxide). The acids and oxide are triturated together; then a little water is added, and the mixture heated carefully on a water-bath until the colour of the oxide disappears (if the acids separated from tallow be used, the operation must be completed by finally heating carefully on an oil-bath); to obtain good results excessive heating must be avoided. The following table gives—(1) the source; (2) saponification-equivalent; (3) average molecular weight; and (4) iodine absorption of the fatty acids; (5) percentage of H_2O ; (6) colour, and (7) consistence of the resulting soaps.

1	2	3	4	5	6	7
Sesame oil .	198·0	283·3	110·5	28·26	yellowish	of cold cream
Olive oil .	200·3	280·1	88·5	28·48	yellow	"
Lard . . .	202·0	277·8	65·0	28·69	almost white	firmer
Palm oil .	207·0	271·0	53·4	29·18	orange to brown	"
Beef suet .	200·0	280·5	38·5	28·45	almost white	of lead plaster
Cocoanut oil	276·3	205·3	8·6	35·10	"	waxy
Stearic acid	205·7	272·7	1·7	29·05	"	friable

The consistence of the soaps, also their susceptibility to decomposition by heat, follow the variation in the iodine-absorption of the fatty acids; while the soap made from sesame oil-acids is soft, so that it can be drawn into threads, it is most easily decomposed by heat; commercial stearic acid yields a soap so hard that it can be powdered and used in this condition. These soaps are much more permanent than the commercial oleates (solution of true oleate in excess of oleic acid); for the preparation of pastes and ointments the soap made from olive oil is most desirable, while for plasters the soaps from beef suet or cocoanut oil, owing to their firmer consistency, are to be preferred. For these purposes it is only necessary to soften the soaps on a water-bath and then incorporate the other ingredients.

Examination of Commercial Medicated Wools. J. H. Hoseason. (*Chemist and Druggist*, February 18th, 1893, 236.) Commercial samples of carbolic, boric, and sublimated wools have been examined by the author, with the following results:—

1.	Carbolic acid	1·056 per cent.
2.	"	1·066 "
3.	"	0·690 "
4.	"	0·250 "
5.	"	5·08 "
6.	Boric acid	36·0 "
7.	"	21·6 "
8.	"	27·1 "
9.	"	15·8 "
10.	"	16·4 "
11.	Corrosive sublimate	none.
12.	"	1 in 8000 to 9000.

From these variations the conclusion is drawn that the samples had either been badly prepared or badly kept, or that both causes had been at work together. The necessity is insisted on of such articles being kept in perfectly air-tight vessels.

The mode of examination will be found fully described in the paper.

Ether as a Menstruum in Medication by the Skin. Sir J. Sawyer. (*Pharm. Journ.*, 3rd series, xxiii. 301.) The author pleads in favour of a more extensive application of ether as a menstruum for the preparation of tinctures and liniments intended for external application. He does so on the ground that it is a good solvent of the active principles of many drugs, and at the same time a ready solvent of the fatty constituents of the sebaceous secretion of the skin, and as such favouring absorption.

NOTES AND FORMULÆ.

PART III.

NOTES AND FORMULÆ.

Bouillie Bordelaise, a Specific for the Potato Blight caused by *Phytophthora Infestans*. (*Kew Bulletin*, October, 1892.)

Copper sulphate	. . . . .	45 lbs.
Quicklime	. . . . .	22½ "
Water	. . . . .	220 gallons.

The sulphate is dissolved by suspending it in a coarse cloth in a wooden vessel containing the water. Slake the quicklime in a separate vessel, and after stirring thoroughly with added water, pass it through a sieve into the copper solution, stir well, and add the remaining water. The quantity specified is sufficient for one acre of land.

Deodorization of Carbon Bisulphide. (*Amer. Drugg.*, January, 1893. From *Nouv. Rem.*) The disagreeable odour of carbon bisulphide may be removed by shaking with a one per cent. solution of corrosive sublimate, which will precipitate the sulphur in solution, leaving the bisulphide odourless on decantation.

Deodorization of Iodoform. (*Merck's Bulletin*, 1892, 284.) The incorporation of eight drops of oil of coriander with each drachm of iodoform is recommended as a satisfactory means of deodorizing the latter.

Deodorization of Iodoform. (*Pharm. Zeitung*.) The process suggested for the deodorization of iodoform consists in the addition of half a per cent. of carbolic acid and one per cent. of essence of peppermint.

Permanent Morphine Solution. (*Répertoire de Pharm.*, 1893, 79.) A solution of 1 gram of morphine hydrochlorate in a mixture of 5 grams of alcohol and 10 grams of glycerin, when mixed with 15 grams of distilled water, and filtered, is stated to keep for months without the slightest change.

Incompatibility of Exalgin and Salicylic Acid. M. de Parel. (*Répertoire de Pharm.*, July, 1892.) The author points out that

these two substances should not be prescribed together in a solid form, as the mixture soon becomes pasty and subsequently liquefies. No such change is produced in a mixture of exalgin and salicylate of soda.

Cocaine Carbolate as a Substitute for Cocaine Hydrochlorate. D. B. Kyle. (From *Therapeutic Gazette*.) The author finds cocaine carbolate to be most useful for the production of local anæsthesia, and not to give rise to the serious symptoms occasionally following the administration of the hydrochlorate. Its solution has the advantage of possessing much greater stability.

Note on a Substitute for Calamine. W. Lyon. (*Pharm. Journ.*, 3rd series, xxiii. 621-622.) The great variability in the composition of commercial calamine, and the practical impossibility of obtaining a supply of native calamine answering the characters and tests of the Pharmacopœia, have induced the author to recommend the following directions for the production of a uniform artificial preparation in which the whole of the carbonate is converted into oxide:—Dissolve 861 parts of crystallized sulphate of zinc in water, and add 15 fluid parts of strong solution of perchloride of iron, B.P. Next dissolve 890 parts of crystallized sodium carbonate in a separate quantity of water, and pour the solution into that of the zinc and iron salts. Shake well, and then collect the precipitate on a calico filter. Wash with cold water until free from sulphate, and then place in a lightly covered crucible and subject it to a dull-red heat, until a portion of it taken from the crucible ceases to effervesce, on the addition of an acid. Remove the crucible from the source of heat, and when cold, transfer the contents to a mortar, and grind to an impalpable powder.

The product is constant in composition, perfectly uniform, and can be much more readily suspended in water than native calamine. Even under high powers of the microscope it shows no separate particles of ferric oxide, which are so easily seen in artificial calamine prepared by mixing ferric oxide with zinc carbonate.

Note on Mercuric Chloride in Spirituous Solutions. J. R. Johnson. (*Chemist and Druggist*, November 5th, 1892, 681.) Spirituous solutions of mercuric chloride suffer from instability, due to a reduction of the mercuric chloride. The author shows that this may be remedied by passing chlorine gas through the solution for about five to ten minutes, which causes an immediate re-solution of any deposit that may have formed already, and yields a prepara-

tion remaining bright and stable under ordinary conditions of light and temperature. In direct sunlight, a very slight reduction takes place after some time.

Note on Sublimated Cotton. L. Vignon. (*Comptes Rendus*, cxvi. 517 and 645.) The author points out that when cotton is soaked in weak solutions of corrosive sublimate, the latter undergoes a certain amount of decomposition into mercuric oxide and hydrochloric acid, the former of which is fixed upon the fibre. A little mercurous chloride is found to be slowly formed at the same time.

Acid Sublimate Dressing. A. Levy. (*Amer. Journ. Pharm.*, August, 1892.) The author suggests the preparation of compressed tablets containing 5 parts of tartaric acid to 1 part of mercuric chloride. These dissolve readily in warm water, yielding solutions well adapted for use as dressings. Ordinary solutions of corrosive sublimate are rendered inefficient as antiseptics by contact with albuminous and other organic matters; but this may be prevented by the addition of tartaric acid.

Improved Antiseptic Powder. T. J. Keenan. (*American Druggist*, March, 1892.) The author recommends the following formula, which has been successfully used in hospital practice in the treatment of chronic ulcers, suppurating sores, and generally as a cheap and efficient iodoform substitute:—

Salol, powdered	1 ounce.
Sulphite of zinc, powdered	1½ ounces.
Benzoin, powdered	½ ounce.
Purified talcum	2 ounces.
Oil of fennel	20 minims.

Mix.

Antiseptic Powder for Dressings. Dr. Cavazzini. (*Nouv. Rem.*, 1892, 436.) The preparation recommended by the author is composed of 55 parts of iodoform, 20 parts each of salicylic acid and bismuth subnitrate, and 5 parts of camphor. By the application of this powder, granulations are favourably influenced, and suppuration is greatly diminished.

Soluble Carbolic Disinfectant. E. Hirschsohn. (*Pharm. Zeitschr. für Russland*, 1893, No. 8.) The author states that by treating 100 parts of crude carbolic acid with 50 parts of finely powdered resin, and a solution of 8 parts of sodium hydrate in 16 parts of water until solution is effected, a liquid is obtained which gives an almost clear solution with 10 volumes of water.

Borosaliclic Acid as a Surgical Antiseptic. MM. Carcano

and Cesaris. (*Journ. de Pharm. d'Anvers*, February, 1893, 55.) In the place of salicylic acid, which is comparatively insoluble, and of corrosive sublimate, which is poisonous, the authors suggest the use of a solution containing 12 parts of boric acid and 6 parts of salicylic acid in 1,000 parts of water. This is stated to be a harmless and efficient microbicide.

Fluorides as Antiseptics. S. Baekeland. (*Journ. Amer. Chem. Soc.*, xiv. 212 and 219.) The author states that fluorides prevent the development of the organisms causing butyric and lactic fermentations, but have much less action on the alcoholic ferment. Their action on yeasts seems to vary with the kind of yeast employed, some being sensitive to its influence, while others prove resisting. He finds that with an addition of $\frac{1}{1000}$ part of fluoride, yeasts can be kept for six months without losing the power of inducing alcoholic fermentation. The action of diastase is not interfered with, but rather promoted by fluorides, which also exercise a preserving effect upon this chemical ferment.

Action of Sodium Fluoride on Vital and Chemical Fermentations. M. Arthus and A. Huber. (*Comptes Rendus*, cxv. 839.) The authors' researches tend to show that sodium fluoride applied in the proportion of 1 per cent. definitely arrests vital fermentations (due to the development of living organisms), while having no disturbing action on chemical fermentations (such as diastatic action). It is stated that a sharp line of demarcation can thus be drawn between these two kinds of fermentative processes.

Note on Calcium Bisulphite as an Antiseptic. H. Berg. (*Rev. Internat. de Bibl. méd.*, 1892, 222.) Calcium bisulphite is recommended by the author as a valuable antiseptic, which is non-poisonous, inexpensive, free from corrosive action on the healthy tissues, and acts as a powerful destroyer of infectious germs. It is readily obtained in the form of a colourless solution, having a characteristic and easily recognisable odour.

Note on the Antiseptic Action of Iodine Trichloride. A. Tschirch. (*Schweiz. Wochenschr. für Chem. und Pharm.*, 1892, 229.) The author finds that iodine trichloride, when brought into contact with water, is immediately decomposed with the formation of the monochloride, and of hydrochloric and iodic acids, the two latter of which have but a slight action, while iodine monochloride is a powerful antiseptic. It is therefore to the monochloride thus formed that the antiseptic properties of the trichloride must be mainly attributed.

Bismuth Sub-Gallate as a Microbicide. M. Colosanti.

(*Merck's Bulletin*, 1892, 278.) This salt has been used with success in diarrhoea, and is found by the author to possess in a marked degree the power of arresting the growth and vitality of microbes. It is stated to be more active in this respect than iodoform and aristol, and to be free from poisonous effects.

Kresin. (*Pharm. Centralhalle*, 1892, 698.) The name kresin is applied to a solution of cresol in a solution of sodium cresoxyl acetate. It is a clear brown liquid, stated to contain 25 per cent. of cresols, and to form clear mixtures with water and alcohol in all proportions. Though less toxic than phenol, it is said to be equal to four times its quantity of the latter in disinfecting power. Even in very weak solutions it has a deodorizing effect. Aqueous solutions containing $\frac{1}{2}$ to 1 per cent. are recommended for antiseptic dressings, and slightly stronger solutions for the disinfection of utensils, surgical instruments, etc.

Phenolin. (*Pharm. Centralhalle*, 1892, 698.) The disinfectant recently introduced, under the name of water-soluble phenolin, by a Brunswick firm, is a combination of crude cresols and potash soap.

Antisepsin. M. Vignerat. (*Pharm. Centralhalle*, xxxiv. 152.) This name is now applied by the author to a lymph prepared in the following manner:—One to 2 c.c. of a 5 per cent. solution of iodine trichloride are injected into an abscess, and the serum emitted from the same used for further injections. The name antisepsin was formerly also used for monobromacetanilid.

Permeability of the Skin to Microbes. B. Wasmuth. (*Chem. News*, March 17th, 1893. From *Centralbl. für Bakteriöl.*) The researches conducted by the author upon himself with *Staphylococcus pyogenes albus* and *aureus*, with *Staphylococci*, and the cocci of erysipelas upon rabbits, guinea-pigs, and white mice, and with virulent splenic fever on guinea-pigs, prove that the healthy, uninjured skin of man and other animals is permeable to micro-organisms. They find entrance along the sheath of the hairs, but not by the sudatory pores. Inunction with microbes mixed with lanoline makes no difference in the nature and the speed of the infection.

Action of Carbonic Acid on Microbes. A. Montefusco. (*Inter. Med. Mag.*, i. 664.) The author's observations lead to the inference that carbonic acid waters have a destructive action on certain microbes, and that their hygienic properties are to some extent due to this influence.

Acidulated Aërated Water. E. Jakobsen. (*Apoth. Zeitung*,

vii. 459.) The author considers the presence of alkaline carbonates in soda water and other effervescing beverages merely intended as refreshing drinks, as objectionable during a cholera epidemic, owing to the tendency of alkaline liquids to promote the development of the comma bacillus. He suggests at such times the use of a pure aerated water containing an addition of a very small proportion of hydrochloric or citric acid.

Wienit, a Saline Preservative of Meat. (*Pharm. Zeitung*, July 1st, 1893.) This name is applied to a mixture of salicylic acid, boric acid, and borax, and is employed for the preservation of fresh meat. Another preparation recommended for smoked meat consists of boric acid, common salt, and saltpetre.

Curry-Powder. (*Chemist and Druggist*, October 22nd, 1892.)

Pulv. coriand.	. . . . .	3ij.
„ zingib.	. . . . .	3ij.
„ capsici.	. . . . .	3ias.
„ cardam. sem.	. . . . .	3iv.
„ pip. nig.	. . . . .	3iij.
„ cumin. sem.	. . . . .	3ij.
„ caryoph.	. . . . .	3j.
„ turmeric	. . . . .	3xij.

M.

Additions to the Berlin Formulary. (*Amer. Druggist*. From *Pharm. Centralhalle*.) The edition of the *Berlin Formulary* for 1893 contains a large number of new formulæ, the more important of which are here reproduced.

Collodium Iodoformi.

Iodoformi	1·5 gram.
Collodii elastici	ad 15·0 „

Injectio Bismuthi.

Bismuthi subnitratiss	5·0 „
Aquæ destillatæ	ad 200·0 „

Iodoformum Desodoratum.

Olei ligni sassafras	gtt. II.
Iodoformi	ad 10·0 gram.

Linimentum Chloroformi.

Chloroformi	20·0 „
Linimenti ammoniati	80·0 „

Mixtura Antirheumatica.

Sodii salicylatis	10·0 gram.
Tincturæ aurantii	5·0 „
Aquæ destillatæ	ad 200·0 „

One tablespoonful four times a day.

Mixtura Diuretica.

Liquoris potassæ acetatis	30·0 „
Olei petroselinii	gtt. II.
Aquæ destillatæ	ad 200·0 gram.

One tablespoonful three times a day.

Mixtura Nervina.

Potassii bromidi	8·0 „
Sodii bromidi	„
Ammonii bromidi	āā 4·0 „
Aquæ destillatæ	ad 200·0 „

One tablespoonful three times a day.

Oleum Zinci.

Zinci oxydati	„
Olei Olivarum	āā 25·0 „

Pasta Aseptica.

Acidi salicylici	0·5 „
Acidi borici pulv.	5·0 „
Zinci oxydati	10·0 „
Petrolati	ad 50·0 „

Pilulæ Asiaticæ.

Acidi arsenicosi	0·06 „
Piperis nigri pulv.	1·5 „
Radiceis liquiritiæ pulv.	3·0 „
Mucil. gummi arabici q. s. ut. f. pil. No. 60.	„
Each pill contains 0·001 gram of arsenious acid.	

Pilulæ Expectorantes.

Terpini hydrati	3·0 gram.
Radiceis liquiritiæ pulv.	1·0 „
Succi liquiritiæ pulv.	2·0 „
M. f. pil. No. 80.	„

Two pills three times a day.

Pilulæ Ferri Arsenicosi.

Ferri redacti	3·0 „
Acidi arsenicosi	0·06 „
Piperis nigri pulv.	„
Radiceis liquiritiæ pulv.	āā 1·5 „
Mucil. gummi arabici q. s. ut. f. pil. No. 60.	„

Two pills three times a day.

Pulvis Exsiccans.

Zinci oxydati pro usu ext.	
Amyli	āā 25·0 gram.

Pulvis Stomachicus.

Bismuthi subnitratis	
Radiciſ rhei pulv.	āā 5·0 ..
Sodæ bicarbonatis	20 0 ..

Solutio iodi Lugol.

Potassii iodidi	5·0 ..
Tincturæ iodi	20·0 ..
Aquæ destillatæ	ad 200·0 ..
For external use.	

Spiritus Creosoti.

Creosoti	2·0 ..
Spiritus vini gallici	ad 100·0 ..
A teaspoonful at a dose.	

Spiritus Vini Aromaticus.

Tincturæ aromaticæ	0·4 ..
Spiritus ætheris nitrosi	0·5 ..
Tincturæ ratanhiaſ	gtt. VI.
Spiritus rect.	100·0 gram.
Aquæ destillatæ	ad 200·0 ..

Tinctura Antidiarrhoica.

Tincturæ nucis vomicæ	2·0 ..
Tincturæ opii	2·0 ..
Tincturæ cascarillæ	10·0 ..
Fifteen drops three times a day.	

Tinctura Excitans.

Tincturæ castorei	5·0 ..
Tincturæ volariaſ	10·0 ..
Ten drops every two hours.	

Tinctura Pepsini.

Pepsini	
Acidi hydrochlorici	āā 2·0 ..
Tincturæ cinchonæ	ad 30·0 ..
Twenty drops three times a day in a wineglass of water.	

Unguentum Contra Perniones Seu Camphoratum.

Camphoræ tritæ	5·0 gram.
Petrolati	ad 50·0 ..

Unguentum Iodoformi.

Iodoformi	2·5 ..
Petrolati	ad 25·0 ..

Notes on Koumiss and Koumiss Preparations. D. H. Davies. (*Pharm. Journ.*, 3rd series, xxii. 301-302.) The original koumiss is made from mare's milk, which is less rich in casein and fatty matter than cow's milk, but contains a much larger proportion of sugar of milk. Cow's milk is therefore best diluted with water, to reduce the percentage of the two former constituents, and brought up to mare's milk by the addition of milk-sugar. The following formula is stated to answer very well:—

Take of—

Fresh milk	12 ounces.
Water	4 „
Brown sugar	2½ drachms.
Compressed yeast	24 grains.
Milk-sugar	3 drachms.

Dissolve the milk-sugar in the water, add to the milk, rub the yeast and brown sugar down in a mortar with a little of the mixture, then strain into the other portion. Fill strong bottles with this mixture, cork tightly, and fasten the corks with wire. During the first few days the bottles are kept at a moderate temperature, and shaken each day for about ten minutes to prevent the clotting of the casein. Some few days elapse before the fermentation passes into the acid stage, and when this has taken place the preparation is much thicker. It is now in the proper condition for allaying sickness, being retained by the stomach when almost everything else is rejected. When thus ready, it requires to be stored in a cool place if not wanted for immediate use.

Aërated Whey, which is a very refreshing drink in cases of fever, and much used in some parts of Germany, can also be manufactured on the same principle as koumiss.

Malted Koumiss can be made as follows:—

Extract of malt	1½ ounces.
Compressed yeast	20 grains.
Brown sugar	10 „
Milk, sufficient to fill one champagne pint.	

Directions for preparing *Eunymized Koumiss*, *Coca Koumiss*, and *Peptonized Koumiss* will be found in the author's paper.

Iodized Syrup of Rhatany. Prof. Goll. (*Pharm. Zeitung*, January 14th, 1893.) The author recommends a syrup containing 0·2 per cent. of iodine in combination with the astringent constituents of rhatany. The syrup is stated to constitute a mild iodine preparation, producing the therapeutic effects of this element without the unpleasant coryza-like symptoms, and without

affecting the kidneys. It may be advantageously administered in combination with extract of cinchona.

Cascara Sagrada Cordial. Dr. Dujardin-Beaumetz. (*Chemist and Druggist*, January 7th, 1893.)

Fluid extract of cascara sagrada . . .	℥iij.
Glycerin	℥iij.
Oil of orange	℥vj.
Oil of cinnamon	℥ij.
Spirit	℥vii.
Syrup	℥x.
Water to	Oij.

Mix.

Dose : An ounce or more.

Syrup of Narceine. C. Patronillard. (*Journ. de Pharm. et de Chim.*, April, 1893, 397.) This syrup is prepared by triturating 0·25 gram of narceine with 0·40 gram of sodium benzoate and 300 grams of simple syrup.

Antimigraine Powder. (*American Druggist*, April, 1893, 207.)

Caffeine	20 grams.
Antipyrin	40 "
Sugar	50 "

These are intimately mixed and divided into powders, weighing 1·30 to 1·50 grams each. At the time of pain one is administered in a small quantity of water. If the pain does not cease in an hour, another is given. For children under twelve years, only half of this dose is to be administered.

Formulæ for the Exhibition of Aristol. M. Séguier. (*Journ. de Pharm. et de Chim.*, November, 1892, 456.)

Aristol Collodion. Aristol, 1 gram; flexible collodion, 9 grams.

Aristol Ointment. Aristol, 10 grams; olive oil, 20 grams; lanolin, 70 grams.

Aristol Crayons. Aristol, 0·10 to 0·50 gram; cacao butter, 5 grams.

Essential Oil Emulsions. H. Kahn. (*Chemist and Druggist*, October 22nd, 1892. From the *Apothecary*.) The author states that a good emulsion of oil of turpentine, or of any other volatile oil, may be made by the following formula :—

Oil	½ fluid oz.
Tragacanth	80 grains.
Syrup	1 fluid oz.
Water enough to make	4 " ozs.

To the oil contained in a dry bottle add the tragacanth, and shake; add 1 fluid ounce of water, and agitate vigorously. Then add the syrup in portions, shaking after each addition, and finally enough water, in portions (shaking after each addition), to make 4 fluid ounces.

Glycerite of Oil of Cade. C. E. Quinquand. (*L'Union pharmaceutique*, 1893, 190.) This preparation is recommended for the local treatment of psoriasis, and is obtained by intimately mixing 140 parts of oil of cade with 15 parts of fluid extract of quillaia, and 845 of glycerite of starch. Previous to its application, a plaster composed of two parts of poppy-seed oil, one of yellow wax, and two of lead plaster should be applied to the diseased surfaces, and this should be followed by a lukewarm alkaline bath containing 100 grams of sodium carbonate. After this bath the affected parts are anointed with the above glycerite.

Mistura Glycyrrhizæ Composita. W. L. Stephen. (*Amer. Journ. Pharm.*, November, 1892.) The following formula is stated to yield a preparation free from liability to deposition:—

R. Acaciæ pulv.	3ss.
Ext. glycyrrhizæ pulv.	3ss.
Sacchari pulv.	3ss.
Spts. æth. nit.	f. 3ss.
Vin. antimonii	f. ʒi.
Tr. opii camph.	f. ʒii.
Aquæ dest.	f. ʒxii.

Mix the powders, gradually add 6 ounces of water, and rub to a paste. Place this in an evaporating dish, and heat until perfectly fluid. After cooling, add the sweet spirit of nitre, wine of antimony and paregoric elixir, and the remainder of the water.

Liquor Ferri Salicylatis. (*Amer. Journ. Pharm.*, May, 1893.) The formula here recommended is a modification of the one given in Remington's practice of pharmacy:—

Dissolve 384 grains of pure ferrous sulphate and 320 grains of sodium acetate in seven fluid ounces of distilled water. Then dissolve separately 480 grains of sodium salicylate in seven fluid ounces of distilled water; mix the solutions, filter, and wash with sufficient distilled water to make fifteen fluid ounces; to this add one fluid ounce of glycerin.

Glycerin Suppositories. J. P. Remington. (*Amer. Journ. Pharm.*, September, 1892.) Referring to the difficulty of com-

binning comparatively large quantities of glycerin in suppositories, the author recommends the following formula as giving a very satisfactory product:—

40 grains of sodium carbonate are dissolved in 1,080 grains of glycerin, and to this 80 grains of stearic acid are added, and the mixture is heated on a water-bath until effervescence ceases. It is then poured into a mould to make twelve suppositories. As these contain about 90 per cent. of glycerin, they must be protected from the action of moist air, which has a tendency to liquefy them.

Medicated Glycerin Suppositories. Dr. Kohlstock. (*Pharm. Post.*, 1893, 104.) Successful clinical experiments in rectal applications of *aloin*, *colocynthin*, and *citrullin* (colocynthidin) suggested a combination of these cathartics with glycerin suppositories. These are made containing in each suppository either 0.5 gram of aloin, 0.03 gram of colocynthin, or 0.02 gram of citrullin; of these the suppositories containing aloin are used in mild cases of constipation, those containing colocynthin in more serious cases, whilst those containing citrullin are recommended in case of failure of the others.

Lanolin Milk. E. Dieterich. (*Pharm. Zeitung*, 1892, 429.) 20 grams of powdered soap, 10 of powdered borax, 70 of water, 30 of cocoanut oil, and 70 of hydrated lanolin are triturated together for 10 minutes, and then gradually and thoroughly mixed with 800 c.c. of warm rose-water. The mixture is perfumed with 10 drops each of the oils of bergamot and orange flower, 5 drops of oil of rose, and one drop of oil of wintergreen.

Lanain. H. Hirzel. (*Apotheker Zeitung*, 1893, 57. From *Amer. Journ. Pharm.*) Lanain, patented as a pure neutral wool-fat, is put upon the market as a soft, yellowish, homogeneous mass, melting at about 36° C.; it has only a faint odour indicative of its origin, and loses this after some time; applied to the skin, this odour is not persistent; it is perfectly neutral in reaction and permanent in air. By mixing with water, it changes to a white, unctuous ointment, the surface of which becomes brown on exposure; it is possible to incorporate as much as four times its own weight of water; by incorporating 25 per cent. of water, lanolin is obtainable. Lanain is very quickly absorbed by the skin, so that this property, also possessed by lanolin, is not due to the water contained in the latter. Lanain is offered as a substitute for the different fats and some fixed oils in the preparation of ointments, pomades, etc.

Improved Formula for Linimentum Saponis. G. W. Sloan.
(*Chemist and Druggist*, January 28th, 1893.)

Castile soap, in powder	70 grains.
Camphor, in small pieces	45 „
Oil of rosemary	10 c.c.
Rectified spirit	750 „
Water, to make	1,000 „

Mix the ingredients (except the water) together in a bottle, shake until the camphor is dissolved, then add enough water to make up the required volume, and shake; filter.

Depilatory Powder. H. Unna. (*Aertzt. Prakt.; American Druggist*, February, 1893.) The author recommends the following as a harmless and efficient depilatory:—

Barium sulphate,
Zinc oxide,
Powdered starch, of each equal parts.

Stir the powder to a paste with water, and apply. It will dry in about ten minutes, and on removing it the surface will be found to be bare of hair. While no irritation follows this application, it should not be applied to the same spot two days in succession.

Arnica Opodeldoc. (*Chemist and Druggist*, April 8th, 1893.)

Tr. opii	3j.
„ arnica	3ij.
Lin. saponis ad	3iss.

M.

Chloral-Camphor Glycerin. (*Chemist and Druggist*, June 3rd, 1893.) This combination is used in Germany as a topical application for certain soft ulcerous skin-affections. It is made by rubbing together 5 parts of chloral hydrate and 3 parts of camphor, and dissolving the resulting liquid in 25 parts (by weight) of glycerin, heated to about 50–60° C. In a short time the camphor crystallizes out, so that the solution must be made as required.

Salol Glycerin. A. Suchomel. (*Chemist and Druggist*. From *Pharmaceutische Post*.) This is a preparation of salol which may be used for application to the throat or the skin. Rub up 150 grains of salol with 75 grains of gum acacia and 1 drachm of water to make an emulsion, then add sufficient glycerin to make 3 ounces.

Application for Burns. (*American Druggist*, January, 1893.)

The author recommends the following ointment as a dressing for burns:—

Euophen	8 grams.
Olive oil	7 "
Vaselin	60 "
Lanolin	80 "

Cooling Lotion. (*Chemist and Druggist*, January 28th, 1893.)

Spt. vin. rect.	3j.
Potass. nitrat.	5iv.
Acid. acetic	5iv.
Aq. camphoræ	3xx.

M.

Pain-Killer. (*Pharm. Zeitung*, January 7th, 1893.) One part of capsicum fruit is extracted by percolation with 5 parts of rectified spirit. To 1000 parts of tincture thus obtained, 25 grams of camphor, 50 grams of solution of ammonia, 10 grams of oil of rosemary, and 5 grams of oil of thyme are added. The preparation is used as a liniment.

Ointment for Chronic Eczema. (*Chemist and Druggist*, October 22nd, 1892.)

Tincture of male fern	3j.
Rectified spirit	3ss.
Tincture of myrrh	3j.
Powdered opium	3j.

Macerate for a few days, and filter.

The parts affected are first to be washed with potash soap, and then painted with the above tincture. In about fourteen days chronic cases show a very healthy condition.

Ointment for Hæmorrhoids. Dr. Allingham. (*Chemist and Druggist*, October 22nd, 1892.) The author recommends the following:—

Calomel	5ss.
Morph. hydrochlor	gr. ij.
Bismuth. subnit.	3vj.
Vaselin	5vj.
Glycerin	5ij.

Misce, fiat ung.

To be applied night and morning.

Wash for Pruritus. (*Therap. Blatt.*; *American Druggist*, February, 1893.)

Menthol	4 grams.
Alcohol	80 "
Water	60 "
Diluted acetic acid	120 "

Ointment for Ulcerated Chilblains. Dr. Brogg. (*Internat. klin. Rundschau; Chem. and Drugg.*, October 22nd, 1892.)

Acid. carbolic	gr. xv.
Unguent. plumb.	3v.
Lanolin	3v.
Ol. amygdal. dulc.	3iiss.
Ol. lavandul.	gtt. xx.

M.

Apply two or three times a day.

Pommade Sulfonée. P. Carles. (*Pharm. Zeitung*, February 22nd, 1893. From *Journ. de Méd. de Bordeaux*.) This name is given by the author to an intimate mixture of 1 part of strong sulphuric acid and 5 parts of lard. It is strongly recommended as a counter-irritant in cases of neuralgia and local rheumatism, and for the relief of troublesome irritation of the respiratory passages. When applied, it should be covered with a layer of cotton-wool to prevent the clothes from being corroded. Its action is like that of mustard, croton oil, and similar irritants, over which it has the advantage of being readily removable by washing with water. It is stated not to contain the sulphuric acid in the free state, but in the form of sulpho-compounds of the fatty acids.

Preservation of Vaccine Lymph by Means of Glycerin. M.M. Chambon and Ménard. (*Brit. Med. Journ., Epit.*, No. 1679, 33.) The authors find that the addition of glycerin to vaccine lymph, and storing of the mixture in sterilized tubes, causes a gradual improvement in the quality and activity of the lymph, and a diminution in the number of parasitic microbes.

Corn Solvent. (*Journ. de Pharm. et de Chim.*, February, 1893, 248.) Dissolve 1 part of extract of Indian hemp, 10 parts of salicylic acid, and 5 parts of turpentine in 82 parts of collodion, and add 2 parts of acetic acid.

Pills for Tapeworm. C. Dummer. (*Chemist and Druggist*, December 3rd, 1892.)

Extract of male fern.	80 grains.
Asafoetida	15 "
Aloes	7½ "
Cacao butter	80 "
Kaolin, sifted	80 "

Make into 15 pills.

This gives a good plastic mass, which can easily be rolled and formed into pills by the aid of some kaolin. First, the aloes and

asafetida are rubbed together in a mortar as fine as possible; next, one-half of the kaolin is added, and all are rubbed together to a uniform powder; finally, the rest of the kaolin is added and the oil of male fern and cacao butter. Let the pills cool a few hours, and then give them two coats of cacao butter, in order to protect them against the influence of the ammonia in the keratin solution, which should be applied as a coating.

Laxative Pills. A. F. Philippeau. (*Journ. de Pharm. et de Chim.*, February, 1893, 248.) The author recommends the following formula:—

Cascara sagrada	.	.	.	0.05 gram.
Extract of nux vomica	}	of each	.	0.01 ..
Extract of belladonna			.	
Powdered ipecacuanha	}	of each	.	0.01 ..
Podophyllin			.	

These quantities are for one pill, which is to be taken at bedtime.

Creasote Pills. M. Limbo. (*Journ. de Pharm. et de Chim.*, October, 1892, 357.) For the administration of creasote in the form of pills, the author recommends the following combination, in which the odour and taste of the creasote is stated to be almost entirely masked:—The creasote is mixed with twice its weight of powdered gum arabic, and after complete absorption of the former, glycerin is added drop by drop until a suitable mass is obtained.

Preparation of Creasote Pills. J. Norberto. (*Pharm. Post.*, 1892, 817.) The author prepares a creasote emulsion from 5.5 parts of gelatin, 12 parts of water, 2.5 parts of sugar, and 20 parts of creasote, which can be readily preserved in a bottle with a tight-fitting glass stopper. This emulsion contains half its weight of creasote. A pill mass can be made from it at any time by the incorporation of small quantities of powdered liquorice and marsh-mallow roots.

Preparation of Tar Pills. Dr. Iwanoff. (*Pharm. Zeitung*, June 10th, 1893.) White bolus is recommended as a suitable substance to convert tar into a pill mass. By means of this excipient, pills can be easily prepared containing $2\frac{1}{2}$ grains of tar in each pill.

Preparation of Pills containing Phosphorus. M. Fourcy. (From *Mon. de la Pharm.*) In order to ensure the perfectly uniform distribution of phosphorus in pill masses, the author suggests the phosphorus to be dissolved in bisulphide of carbon, the solution

to be quickly incorporated with a soft extract (extract of cinchona is recommended), and the powders ordered in the prescription to be then added. The solvent quickly evaporates during the process of mixing.

Preparation of Pills of Nitrate of Silver. M. Wearn. (*Journ. de Pharm. et de Chim.*, 1893, 137.) The finely powdered silver nitrate is triturated with gum arabic, and made into a mass with glucose. Pills made of this mass are stated to retain their form and colour, and not to be liable to undue hardening.

Pill-Coating. M. Fauël. (*Journ. de Pharm. d'Anvers*, February, 1893, 56.) The pills are uniformly moistened with a liquid composed of one part of glycerin and two parts of strong alcohol; they are then rolled in a sufficient quantity of impalpable powder, composed of 4 parts of saccharin, 2 parts of tragacanth, and 1 part of starch. The excess of powder is removed by means of a sieve, and the operation repeated. The pills are then moistened with a mixture of 1 part of glycerin and 2 parts of ether, and rolled in a powder composed of equal parts of French chalk and carbonate of calcium.

Salol-Coating of Pills. A. Suchomel. (*Pharm. Post.*, 1892, 599.) The author doubts the efficiency of the method of coating suggested by P. Yvon (see *Year-Book of Pharmacy*, 1892, 236), and proposes that the pills be dipped into melted salol contained in a small dish placed on a water-bath. After taking the pills off the needles, the small apertures may be closed by applying a little melted salol with a small brush. The coating hardens very quickly, and the pills have the appearance of being sugar-coated.

Notes on the Storage and Preservation of Pills. A. C. Zeig. (*Pacific Druggist*, September 15th, 1892; *Chemist and Druggist*, November 26th, 1892, 771.) The author mentions a number of instances of changes occurring in pills on keeping, and discusses the means for preventing such changes. He advocates storage in bottles tightly corked, protected against light, and remote from any source of heat, preferably in a place where the variations in temperature are not great.

Preparations for the Teeth. (*Apotheker Zeitung*, 1892, 347; *Amer. Journ. Pharm.*, September, 1892.)

Toothache-Drops.—I. Oils of cajeput and cloves, of each 1 part; chloroform, 2 parts.

II.—Camphor and choral hydrate, of each 2 parts; spirit of peppermint, 1 part.

III.—Tincture of *cannabis indica*, oil of cloves and chloroform, equal parts.

IV.—Tincture of opium, oil of peppermint and spirit of ether, equal parts.

Hard Tooth-Soap.—Precipitated chalk, 8 parts; carmine, 0·2 (dissolved in a small quantity of liquid ammonia); powdered soap, 20 parts; oil of peppermint, 0·5; alcohol, 3·0. After moulding, allow to dry.

Soft Tooth-Soap.—Precipitated chalk, 20 parts; carmine, 0·2 (dissolved in a small quantity of liquid ammonia); powdered soap, 5 parts; oil of peppermint, 0·5; syrup, glycerin and alcohol, of each a sufficient quantity.

Liquid Tooth-Soap.—Soap liniment, 100 parts; tincture of myrrh and glycerin, of each 20 parts; oil of peppermint, 0·5.

Tooth-Balsam.—Extract of opium, camphor and Peruvian balsam, of each 1 part; powdered mastich, 2 parts; chloroform, 20; to be applied on cotton.

Tooth-Cement.—Pure zinc oxide, 98 parts; magnesia, 2; glacial phosphoric acid, a sufficient quantity; the powders are to be mixed in a warm mortar, with sufficient melted acid to make a paste, which is to be used at once, as it rapidly hardens.

Tooth-Wax.—Wax, 30 parts; Venetian turpentine, 12; powdered mastich, 5; powdered opium, 3; chloral hydrate, 2·5.

Tooth-Wash.—Tannin, 5 parts; tincture of iodine and tincture of myrrh, of each 2·5; potassium iodide, 1·0; rose water, 180; a teaspoonful in a glassful of warm water used as a wash will prevent decay and loosening of the teeth.

Antiseptic Tooth-Wash.—Saccharin, 1 part; sodium bicarbonate, 0·5; alcohol, 100 parts; oil of peppermint, 11 drops.

Antiseptic Mouth-Wash, Dr. Millon. (*Journ. de Pharm. et de Chim.*, 1892, 624.) The author recommends the following:—

Thymol	0·25 parts.
Benzoic acid	8·00 "
Tincture of eucalyptus	15·0 "
Alcohol	100·00 "
Oil of peppermint	0·50 "

A tablespoonful to be used with a tumblerful of lukewarm water for rinsing the mouth.

Coca Tooth-Paste. (*Chemist and Druggist*, May 20th, 1893.)

Powdered white soap	ʒi.
French chalk	ʒiij.
Cuttle-fish bone	ʒss.
Carmine	ʒss.
Tincture of coca-leaves	ʒss.
Oil of peppermint	℥xx.
„ cascarilla	℥v.
„ linaloes	℥xv.
Glycerin	a sufficiency.

Make into a paste.

Eucalyptus Tooth-Paste. (*Ibid.*)

Precipitated chalk	ʒiij.
French chalk	ʒij.
Powdered white soap	ʒiss.
Starch	ʒiss.
Carmine	gr. xv.
Oil of peppermint	℥xv.
„ rose geranium	℥xv.
„ eucalyptus	ʒss.
„ cloves	℥vj.
„ anise	℥vj.

Glycerin and spirit, of each a sufficiency to make a paste.

Coral Tooth-Paste. (*American Druggist*, January, 1893.)

Talc, Venetian	50 grams.
Purified chalk	30 „
Cuttle-fish bone	20 „
Milk-sugar	5 „
Carmine	5 „
Glycerin	10 „
Extract of violet	10 „
Oil of peppermint	1 „
Oil of rose	5 drops.

Myrrh Dentifrice. C. O. Ingvoldstad. (*Chemist and Druggist*, January 7th, 1893.)

Carbonate of calcium, precipitated	ʒiv.
Myrrh, powdered	ʒiv.
Castile soap, powdered	ʒiv.
Orris-root, powdered	ʒiv.
Oil of peppermint	sufficient to flavour.

M.

Preparations of Myrrh. (*Pharm. Centralhalle*, 1892, 500.)
Unguentum Myrrhæ.—This ointment is stated to answer well in the treatment of eczema, and is made by thoroughly incorporating one

part of myrrh with 10 parts of a mixture of wax and fixed oil at an elevated temperature.

Myrrholin.—This preparation is obtained by digesting myrrh with alcohol and castor oil, and is intended for use as an embalm-ing and preserving agent.

Ammoniated Essence of Lavender. (*Revue de Thérap.*, 1892, 418.)

The following is recommended for smelling bottles :—

Alcohol	250 c.c.
Oil of lavender	10 „
Oil of bergamot	12 „
Oil of cloves	5 „
Oil of cinnamon	5 „
Oil of rose	1 „
Tincture of musk	10 „
Concentrated ammonia	250 „

Formulæ for Brilliantine. (*Amer. Journ. Pharm.*, May, 1893. From *Bullet. de Pharm. de Lyon.*)

(1) Castor oil 6, castile soap 2, benzoin 2, alcohol 200 grams, oil of rose or neroli sufficient.

(2) Glycerin 10, alcohol 100, rose water 100 grams.

(3) Castor oil 6, glycerin 6, benzoin 2, alcohol 200 grams. Per-fume.

Crescent Hair-Dye. (*Chemist and Druggist*, October 22nd, 1892.)

Nitrate or sulphate of copper	3vj.
„ of silver	3vij.
Distilled water	Oijj.
Solution of ammonia	a sufficient quantity.

Dissolve the salts in the water, and add the solution of ammonia carefully until the precipitate is redissolved.

This, properly applied, is stated to produce a very black colour; a lighter shade, even to light brown, can be secured by diluting the solution.

Shampoo. (*American Druggist*, April, 1893, 207.)

Ammonia water	2 fluid ounces.
Alcohol	3 „
Tincture of cantharides	2 fluid drachms.
Oil of bergamot	15 drops.
„ cloves	q. s.
„ origanum	5 drops.
Water	11 fluid ounces.

Dissolve the oils in the alcohol, add the tincture of cantharides, ammonia, and lastly the water.

Substitute for Gum Arabic. (*Nouv. Rem.*, 1892, No. 13.) 10

kilograms of linseed are boiled with 80 kilograms of sulphuric acid and 100 litres of water for three or four hours. The liquid is then filtered and mixed with four times its volume of alcohol. The precipitate is collected, washed, and dried. The product is amorphous, colourless, insipid, and gives a thick mucilage with water.

Almond Cosmetic Cream. (*Pharmaceutical Record.*)

Almonds, blanched	1 oz.
Rose-water	4 ozs.

Beat the almonds to a paste, and add the rose-water; heat to boiling-point, and add—

White wax	1 oz.
Almond oil	2 ozs.
White Castile soap	1 oz.

Mix thoroughly, and add—

Saturated solution of boric acid	2 ozs.
Cologne water	1 oz.
Oil of bitter almonds	4 drops.
„ rose geranium	5 ozs.
Glycerin	1 oz.

M.

Paste for Fixing Labels on Glass, Porcelain, and Iron. (*Amer. Journ. Pharm.*, February, 1893. From *Nouv. Rem.*) 120 grams of gum arabic and 30 grams of gum tragacanth are macerated separately in a little water; the latter mixture is agitated until a viscous emulsion is formed, when the gum arabic solution is added, and the whole filtered through fine linen. With this liquid a solution of 2·5 grams of oil of thyme in 120 grams of glycerin is incorporated. The volume is then made up to one litre by the addition of distilled water. This paste is said to possess remarkable adhesiveness, and to keep well in sealed flasks.

Marine Glue. (*Nouv. Rem.*, April, 1892, iv.) 450 grams of caoutchouc are dissolved in 18 litres of benzol. After about 10 days, when the caoutchouc has all dissolved, shellac is added equal to two or three times the weight of the solution. The mixture is heated and poured on slabs. The glue is used at a temperature of 120° C.

Paste for Cleaning White Kid Gloves. (*Pharm. Zeitung*, June 17th, 1893.) A suitable preparation is obtained for this purpose by mixing 350 parts of solution of chlorinated lime, 30 parts of solution of ammonia, 450 parts of powdered soap, and 600 parts of

water. This paste is applied to the gloves by means of a piece of flannel.

Removal of Grease Spots from Marble. (*Pharm. Zeitung*, June 17th, 1893.) The spots are thickly coated with a paste composed of white bolus and petroleum spirit, and covered over to prevent evaporation. Further addition of petroleum spirit may be made from time to time. After some time the paste is removed and the marble washed with water. If not quite clean yet, washing with ammonia and subsequently with water is recommended.

Cleaning of Plaster Casts. (*Pharm. Zeitung*, June 17th, 1893.) Plaster casts may be cleaned by rubbing the surfaces with a piece of linen soaked with oil of turpentine. To the nicks the turpentine is applied by means of a brush. After this application, the cast is dusted over with precipitated chalk, allowed to dry, and then rubbed with a clean linen cloth.

Black Leather Polish. F. Edel. (*Pharmaceutical Record*.)

White wax, cut in small pieces	5ij.
Ether	3ij.
Logwood extract	5iv.
Gallie acid	3ij.
Tincture of perchloride of iron	3j.
Spirit, to	3xvj.

Dissolve the wax in the ether, allow the extract of logwood and gallic acid to macerate with occasional agitation during twenty-four hours, then strain through cloth and add the tincture of iron. Now add the mixture thus prepared to the ethereal solution of wax, and again strain through cloth.

Furniture Polishes. (*Chemist and Druggist*, January 28th, 1893.)

1. Linseed oil	Ov.
Tincture of benzoin (simple)	3iv.
Archil	3ij.
Vinegar.	3xxj.
Solution of antimony chloride	3vj.
Spirit	3x.

M.

2. Linseed oil	Oiv.
Oil of turpentine	3xvj.
Shellac	3ij.
Spirit	3viiij.

Dissolve the shellac in the spirit, and mix with the other ingredients.

3. Dragon's blood	3ss.
Oil of turpentine	5vj.
Linseed oil	Oj.
Hydrochloric acid	3iss.

Powder the dragon's blood, and shake well with the turpentine. After a day, strain into the linseed oil and add the acid.

4. Linseed oil	Oiv.
Strained ox-gall	3xvj.
Spirit	3xvj.
Dilute nitric acid	3iv.

M.

5. Japan wax	3iv.
Oil of turpentine	3xij.

Shave the wax and dissolve it in the turpentine, then add—

Linseed oil	Oiv.
Spirit	3xij.
Solution of potash	3vj.
Water to	Cong. j.

Make into a cream by brisk agitation, diluting the potash with the water before adding it.

6. Olive oil (sublim. opt.)	Oj.
Dragon's blood (powdered)	3j.
Spirit	3iv.

Mix together, and shake now and then in the course of four days, then strain through fine muslin.

Crimson Marking-Ink. (*Chemist and Druggist*, October 22nd, 1892.)

Nitrate of silver	3j.
Carbonate of soda	3iss.
Tartaric acid	3ij. 3ij.
Strong solution of ammonia	3ij.
Carmine	gr. vj.
Powdered sugar	3vj.
" gum arabic	3x.
Distilled water	a sufficiency.

Dissolve the silver nitrate and sodium carbonate separately in a pint of distilled water, and mix the solutions. Wash the precipitate by decantation with 2 pints of water three times; collect the last on a filter, and wash with a fourth pint of water;

drain well; transfer the precipitate to a mortar and rub up with the tartaric acid; when effervescence ceases, add the ammonia (in which the carmine has been dissolved), then the sugar and gum (previously made into a cream with water). Finally make up to 3vj. with distilled water.

Patent Leather Varnish. (*American Druggist*, January, 1893.)

The following will, it is stated, produce a varnish which will not crack or peel off from leather :—

Rosin	30 parts.
Turpentine	30 „
Oil of turpentine	30 „
Sandarac	60 „
Shellac	120 „
Alcohol	900 „
Lampblack	15 „

Digest the first six ingredients together, and finally add the lampblack.

Tar Paint for Iron Surfaces. (*Chemist and Druggist*, from *Les Corps Gras Ind.*)

Coal tar	15 litres.
Sulphur	2 kilos.
Red lead	2 „
White lead	2 „

The ingredients are mixed intimately and boiled together until the total bulk is reduced to 10 litres.

This process is said to produce a durable paint devoid of tarry odour.

Gold Varnish for Bottle Caps. (*American Druggist*, January, 1893, from *Drog. Zeitung*.)

I. According to Auders.

Gamboge	10 grams.
Buttonlac	100 „
Turpentine	10 „
Alcohol	450 „

II. According to Dieterich.

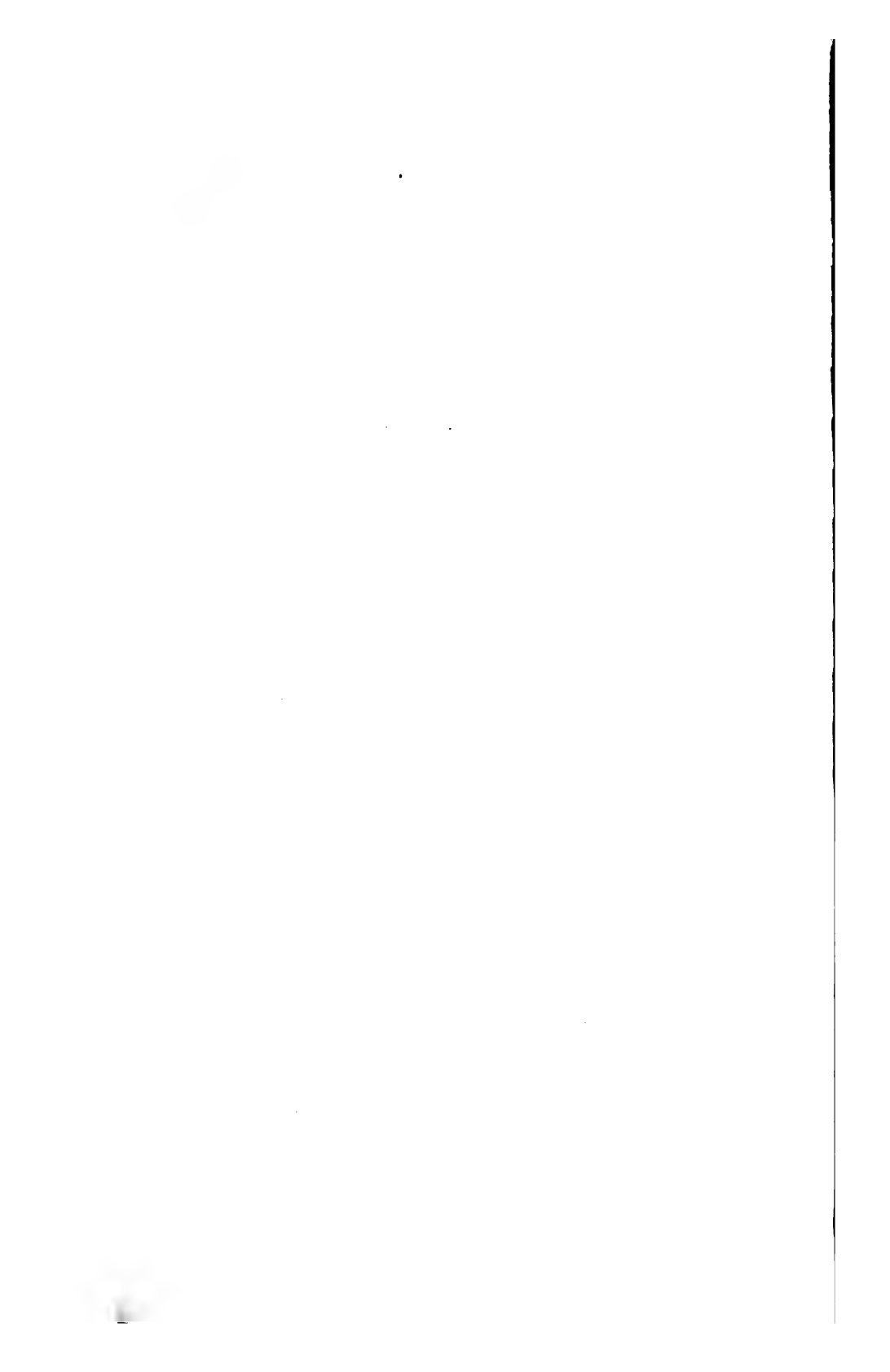
Gamboge	40 grams.
Dragon's blood	5 „
Extract of sandal	5 „
Sandarac	75 „
Venice turpentine	25 „
Alcohol (95 per cent.)	900 „

Dissolve with the aid of heat, and filter.

New Process of Soldering for Aluminium and various other Metals. J. Novel. (*Chem. News*, February 24th, 1893. From *Comptes Rendus*.) Aluminium is soldered with the alloy given below, with the ordinary tinman's soldering iron, or with the blowpipe. It does not oxidize or discolour the metal. The following solders are employed for aluminium:—No. 1. Pure tin; melts at 250°. No. 2. Pure tin, 1000 parts; fine lead, 50 parts. Melts at from 280° to 300°. No. 3. Pure tin, 1000 parts; pure zinc, 50 parts. Melts at from 280° to 300°. These three solders may be used in the manufacture of aluminium trinkets. For the following two solders the soldering iron should be made of pure nickel. No. 4. Pure tin, 1000 parts; pure copper, 10 to 15 parts. Melts at from 350° to 450°. No. 5. Pure tin, 1000 parts; pure nickel, 15 parts. Melts at from 350° to 450°. No. 6. Pure tin, 900 parts; pure copper, 100 parts; bismuth, 2 to 3 parts. Melts at from 350° to 450°, and is recommended for soldering aluminium bronze.

Aluminium Flash Light. A. Villon. (*American Druggist*, January, 1893.) The author recommends the following formula as producing a good flash light:—

Potassium chlorate	20	grams.
Aluminium, powdered	8	"
Sugar	2	"



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TRANSACTIONS
OF THE
British Pharmaceutical Conference
AT THE
THIRTIETH ANNUAL MEETING
AT
NOTTINGHAM
1893.

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British Pharmaceutical Conference.

CONSTITUTION.

Art. I.—This Association shall be called The British Pharmaceutical Conference, and its objects shall be the following :—

1. To hold an annual Conference of those engaged in the practice, or interested in the advancement, of Pharmacy, with the view of promoting their friendly reunion, and increasing their facilities for the cultivation of Pharmaceutical Science.
2. To determine what questions in Pharmaceutical Science require investigation, and when practicable, to allot them to individuals or committees to report thereon.
3. To maintain uncompromisingly the principle of purity in Medicine.
4. To form a bond of union amongst the various associations established for the advancement of Pharmacy, by receiving from them delegates to the annual Conference.

Art. II.—Membership in the Conference shall not be considered as conferring any guarantee of professional competency.

RULES.

1. Any person desiring to become a member of the Conference shall be nominated in writing by a member, and be balloted for at a general meeting of the members, two-thirds of the votes given being needful for his election. If the application be made during the recess, the Executive Committee may elect the candidate by a unanimous vote.

2. The subscription shall be 7s. 6d. annually, which shall be due in advance upon July 1.

3. Any member whose subscription shall be more than two years in arrear, after written application, shall be liable to be removed from the list by the Executive Committee. Members may be expelled for improper conduct by a majority of three-fourths of those voting at a general meeting, provided that fourteen days' notice of such intention of expulsion has been sent by the Secretaries to each member of the Conference.

4. Every association established for the advancement of Pharmacy shall, during its recognition by the Conference, be entitled to send delegates to the annual meeting.

5. The Officers of the Conference shall be a President, four Vice-presidents by election, the past Presidents (who shall be Vice-presidents), a Treasurer, two General Secretaries, one local Secretary, and nine other members, who shall collectively constitute the Executive Committee. Three members of the Executive Committee to retire annually by ballot, the remainder being eligible for re-election. They shall be elected at each annual meeting, by ballot of those present.

6. At each Conference it shall be determined at what place and time to hold that of the next year.

7. Two members shall be elected by the Conference to audit the Treasurer's accounts, such audited accounts to be presented annually.

8. The Executive Committee shall present a report of proceedings annually.

9. These rules shall not be altered except at an annual meeting of the members.

10. Reports on subjects entrusted to individuals or committees for investigation shall be presented to a future meeting of the Conference, whose property they shall become. All reports shall be presented to the Executive Committee at least fourteen days before the annual meeting.

* * Authors are specially requested to send the titles of their Papers to The Hon. Gen. Secs. Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C., two or three weeks before the Annual Meeting. The subjects will then be extensively advertised, and thus full interest will be secured.

FORM OF NOMINATION.

I Nominate

(Name)

(Address)

as a Member of the British Pharmaceutical Conference.

..... Member.

Date

This or any similar form must be filled up legibly, and forwarded to The Asst. Secretary, Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C., who will obtain the necessary signature to the paper.

Pupils and Assistants, as well as Principals, are invited to become members.

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 Weld, Mr. C. C., 9, Strathmore Gardens, Hillhead, Glasgow.
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 West, Mr. T., 1187, Chester Road, Stretford, Manchester.
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 White, Mr. G., 55, High Street, & 115, Hall Street, Dudley.
 White, Mr. J. F., 13, Blenheim Terrace, Leeds.
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 Whitla, Mr. M. R., Medical Hall, Monaghan.
 Whitla, W., M.D., L.A.H., 8, College Square North, Belfast.
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 Whyte, Mr. J. S., 57, Guthrie Port, Arbroath, N.B.
 Widdowson, Mr. Reuben, Nottingham.
 Wiggins, Mr. H., 236, Southwark Park Road, S.E.
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 Wild, Mr. John, 307, Oxford Street, Manchester.
 Wilford, Mr. J., 31, Lower Parliament Street, Nottingham.
 Wilkinson, Mr. B. J., 7, Middleton Road, Kingsland, N.E.
 Wilkinson, Mr. G., 267, Waterloo Road, Manchester.

- Wilkinson, Mr. W., 28, Crumpsall Terrace, Cheetham Hill, Manchester.
 Will, Mr. W. W., Newington Terrace, Kennington Park, S.E.
 Willan, Mr. R., 6, Market Street, Ulverston.
 Willan, Mr. W., 8, Friargate, Preston, Lancs.
 Williams, Mr. E., Cerrig-y-Druoidion, Denbighshire.
 Williams, Mr. E., 10, Wrexham Street, Mold.
 Williams, Mr. J. W., 6, Giltspur Street, E.C.
 Williams, Mr. T., 11, Bute Street, Cardiff.
 Williams, Mr. W. G., Castle Street, Conway.
 Williams, Mr. W. Jesse, Park Hall Buildings, Queen Street, Cardiff.
 Williams, W. Lloyd, A.I.C., Phoenix Mills, Dartford.
 Williamson, Mr. W. H., 72, Elizabeth Street, Manchester.
 Willmott, Mr. W., King's College Hospital, W.C.
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 Wilson, Mr. J., General Infirmary, Derby.
 Wilson, Mr. J., 11, George Street, Bath.
 Wilson, Mr. J. H., 23, West Park, Harrogate.
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 Wilson, Mr. T. W., 2, Victor Street, Thornbury, Bradford.
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 Wing, Mr. G. N., 29, Market Place, Melton Mowbray.
 Wing, Mr. Lewis, Chislehurst, W. Kent.
 Wink, Mr. J. A., 2, Devonshire Square, Bishopsgate Street, E.C.
 Wood, Mr. A., New Brentford.
 Wood, Mr. A. W., 3, James Street, Harrogate.
 Wood, Mr. C. G., 80, High Street, Oldham.
 Wood, Prof. C. H., F.I.C., F.C.S., 46, Loraine Road, Holloway, N.
 Wood, Mr. J., 9, Peel Street, Barnsley, Yorks.
 Wood, Mr. R., 25, Mill Street, Macclesfield.
 Woodland, J., F.L.S., F.C.S., etc., St. George's Hospital, S.W.
 Woolcombe, R. L., LL.D., F.I.Inst., F.S.S., M.B.I.A., 14, Waterloo Road, Dublin.
 Woolley, Mr. E. J., Victoria Bridge, Manchester.
 Woolley, Mr. G., Sparkenhoe Street, Leicester.
 Woolley, Mr. G. S., Victoria Bridge, Manchester.
 Woolley, Mr. Hermann, Victoria Bridge, Manchester.
 Woolley, Mr. S. W., 146, High Street, Southampton.
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 Wright, Mr. G., 102, High Street, Burton-on-Trent.
 Wright, Mr. H. C., 48 & 50, Southwark Street, S.E.
 Wright, Mr. R., 11, Eagle Parade, Buxton, Derbyshire.
 Wyatt, Mr., H., 223, Stanley Road, Bootle, Liverpool.
 Wyatt, Mr. W., 4, Stonewell, Lancaster.
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 Wynne, Mr. E. P., 7, Pier Street, Aberystwith.
 Yates, Mr. D., 32, Darwen Street, Blackburn.

Yates, Mr. F., 64, Park Street, Southwark, S.E.
Yates, Mr. R., 64, Park Street, Southwark, S.E.
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Young, Mr. J. B., 17, North Bridge, Edinburgh.
Young, Mr. J. B., junr., 17, North Bridge, Edinburgh.
Young, Mr. B. F., New Barnet.

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*Members are requested to report any inaccuracies in these lists
by letter, addressed as follows:—*

THE ASST. SECRETARY,

BRIT. PHARM. CONF.,

17, Bloomsbury Square,

London, W.C.

SOCIETIES AND ASSOCIATIONS

INVITED TO SEND DELEGATES TO THE ANNUAL MEETING.

The Pharmaceutical Society of Great Britain.

The North British Branch of the Pharmaceutical Society of Great Britain.

The Pharmaceutical Society of Ireland.

ABERDEEN AND NORTH OF SCOTLAND.—Society of Chemists and Druggists (1839).
Mr. A. Strachan, 188, Rosemount Place, Aberdeen.

BIRMINGHAM.—Midland Counties Chemists' Association (1869). Mr. Chas. Thompson, 159, Stratford Road, Birmingham.

BRIGHTON.—Association of Pharmacy (1861). Mr. Marshall Leigh, 46, Dyke Road, Brighton.

BRISTOL.—Pharmaceutical Association (re-established 1869). G. F. Schaecht, F.C.S., 7, Regent Street, Clifton, Bristol.

COLCHESTER.—Association of Chemists and Druggists (1845). Mr. J. C. Shennstone, 18, High Street, Colchester.

DOVER.—Chemists' Association. Mr. R. M. Ewell, 87, Town Wall Street, Dover.

DUNDEE.—Chemists and Druggists' Association (1868). Mr. J. Russell, 111, Nethergate, Dundee.

EDINBURGH.—Chemists' Assistants' Association. Mr. E. J. Dey, 86, York Place.

EXETER.—Exeter Pharmaceutical Society (1845).

GLASGOW.—Chemists and Druggists' Association (1854).

HASTINGS.—Chemists' Association (1884). Mr. A. N. Beak, 11, York Buildings, Hastings.

HULL.—Chemists' Association (1868). Mr. C. B. Bell, 6, Spring Bank, Hull.

LEEDS.—Chemists' Association (1862). F. W. Branson, F.I.C., F.C.S., 14, Commercial Street, Leeds.

LEICESTER.—Leicester and Leicestershire Chemists' Association.

LIVERPOOL.—Chemists' Association (1868). Mr. Anthony S. Buck, Royal Institution, Liverpool.

LONDON.—Chemists' Assistants' Association. Mr. E. J. Parry, 108, Great Russell Street, W.C.

MANCHESTER.—Pharmaceutical Association. Mr. A. Blackburn, 7, Exchange Street.

NEWCASTLE-UPON-TYNE.—North of England Pharmaceutical Association. Mr. Chas. B. Ford, Durham College of Science, Barras Bridge.

NOTTINGHAM.—Nottingham and Notts Chemists' Association (1863). Mr. W. Gill, Radford Road, Nottingham.

OLDHAM.—Chemists' and Druggists' Assistants and Apprentices' Association (1870). Mr. C. G. Wood, Secretary, Church Institute, Oldham.

SHEFFIELD.—Pharmaceutical and Chemical Society (1869). Mr. C. O. Morrison, 187, West Street, Sheffield.

SUNDERLAND.—Chemists' Association (1869). Mr. J. Harrison, 88, Bridge Street, Sunderland.

**PRESENTATION COPIES OF THE YEAR-BOOK OF PHARMACY ARE
FORWARDED TO THE FOLLOWING :—**

The Honorary Members.

Libraries.

American Pharmaceutical Association; Chemical Society of London; Ecole Supérieure de Pharmacie, Montpellier; Ecole Supérieure de Pharmacie, Paris; Massachusetts College of Pharmacy; The Mason College, Birmingham; Missouri College of Pharmacy; New Zealand Board of Pharmacy; North British Branch of the Pharmaceutical Society; Pharmaceutical Society of Great Britain; Pharmaceutical Society of Ireland; Pharmaceutical Society of New South Wales; Ontario College of Pharmacy, Toronto; Pharmaceutical Society of Australasia; Pharmaceutical Society of Queensland; Royal Society of London; Société de Pharmacie, Paris; State of Illinois Board of Pharmacy; Yorkshire College of Science; British Medical Association.

Provincial Associations (having Libraries).

Aberdeen Society of Chemists and Druggists; Brighton Chemists' Association; Bristol Pharmaceutical Association; Colchester Association of Chemists and Druggists; Dover Chemists' Association; Dundee Chemists and Druggists' Association; Edinburgh Chemists' Assistants' Association; Glasgow Chemists and Druggists' Association; Hastings Chemists' Association; Hull Chemists' Association; Leeds Chemists' Association; Leicester and Leicestershire Chemists' Association; Liverpool Chemists' Association; London Chemists' Assistants' Association; Manchester Chemists and Druggists' Association; Midland Counties Chemists' Association; North of England Pharmaceutical Association; Nottingham and Notts Chemists' Association; Oldham Chemists and Druggists' Assistants and Apprentices' Association; Sheffield Pharmaceutical and Chemical Association; Sunderland Chemists' Association; York Chemists' Association.

Journals.

American Druggist; American Journal of Pharmacy; Archiv der Pharmacie; British Medical Journal; Canadian Pharmaceutical Journal; Chemical News; Chemist and Druggist; Journal de Pharmacie d'Anvers; Journal de Pharmacie et de Chimie; Lancet; Medical Press and Circular; The National Druggist; Pharmaceutical Journal; Pharmaceutische Centralhalle; Répertoire de Pharmacie; Revista Farmaceutica; Pharmaceutical Record.

**THE FOLLOWING JOURNALS ARE RECEIVED FROM THEIR RESPECTIVE
EDITORS :—**

American Druggist; American Journal of Pharmacy; Archives de Pharmacie; Archiv der Pharmacie; Australasian Journal of Pharmacy; British Medical Journal; Canadian Pharmaceutical Journal; Chemical News; Chemist and Druggist; Journal de Pharmacie d'Anvers; Journal de Pharmacie et de Chimie; National Druggist; Pharmaceutical Journal; Pharmaceutical Record; Pharmaceutische Centralhalle; Proceedings of the American Pharmaceutical Association; Répertoire de Pharmacie; Revista Farmaceutica.

PROGRAMME OF THE PROCEEDINGS OF THE BRITISH PHARMACEUTICAL CONFERENCE AT THE THIRTIETH ANNUAL MEETING, NOTTINGHAM, 1893.

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THE SITTINGS OF THE CONFERENCE WERE HELD IN THE
BOROUGH COUNCIL CHAMBER, EXCHANGE HALL, NOTTINGHAM,
ON TUESDAY & WEDNESDAY, AUGUST 15TH AND 16TH, 1893,
Commencing at Ten a.m. each day.

MONDAY, 14th AUGUST.

The **EXECUTIVE COMMITTEE** met according to notices from the Honorary General Secretaries, at 4.30 p.m., at the Borough Council Chamber, Exchange Hall, Nottingham.

TUESDAY, 15th AUGUST.

The **CONFERENCE** met at 10 a.m., adjourning at 1 p.m.; and at 2 p.m., adjourning at 3.30 p.m.

Order of Business.

Address of Welcome by his Worship the Mayor of Nottingham.

Reception of Delegates.

Report of Executive Committee.

Financial Statement.

Report of Treasurer of the "Bell and Hills' Library Fund."

President's Address.

Report of Unofficial Formulary Committee, by W. Martindale, F.C.S.

Reading of Papers and Discussions thereon.

PAPERS.

1. *Report on Coto Bark* (Part 1). By W. ELBORNE, B.A. (Cantab.), F.L.S.
2. *Nottingham Scheme for the Education of Pharmaceutical Students in the Town.* By F. CLOWES, D.Sc., F.I.C.
3. *Note on Collodium Belladonnæ.* By R. WRIGHT.
4. *Liquid Belladonna Plaster.* By W. A. H. NAYLOR.
5. *Suggestions for the Standardisation of the Alkaloidal Tinctures of the British Pharmacopœia.* By E. H. FARR and R. WRIGHT.
6. *Note on the Specific Gravity of Sandalwood Oil.* By M. CONROY.
7. *The Alkaloidal Value of Contum Fruit.* By E. H. FARR and R. WRIGHT.

There was a mid-day adjournment between 1 and 2 p.m. for luncheon at the George Hotel.

At 3.45 p.m. members and friends, to the number of about 200, under the guidance of the Local Committee, left Nottingham by train *en route* for Belvoir Castle, the seat of the Duke of Rutland. On reaching Redmile, brakes were in attendance, and the remaining distance was accomplished by road. Tea was partaken of at the Peacock Arms. After viewing the interior of the Castle, with its magnificent collection of paintings, plate, armoury, etc., and strolling through the extensive grounds, the return journey was made—in the same way as the outward—Nottingham being reached shortly after 9 p.m.

WEDNESDAY, 16th AUGUST.

The Conference met at 10 a.m., adjourning from 1 till 2 p.m. The whole of the business of the Conference was completed this day about 4.30 p.m.

Order of Business.

Reception of Delegates.

Reading of Papers and Discussions thereon.

PAPERS.

8. *Examination of Beeswax.* By E. J. PARRY, B.Sc., and P. A. ESTCOURT, A.I.C.
9. *Note on Easton's Syrup.* By R. WRIGHT.
10. *Effervescent Caffeine Preparations.* By LEWIS OUGH, F.L.S., F.C.S.
11. *The Pharmacy of the Thyroid Gland.* By EDMUND WHITE, B.Sc.
12. *Papain.* By FREDERICK DAVIS, B.Sc.
13. *The Ipecacuanhas of English Commerce.* By E. M. HOLMES, F.L.S.
14. *Deëmetinised Ipecacuanha.* By F. C. J. BIRD.
15. *The Estimation of the Diastasic Action on Starch.* By D. B. DOTT, F.R.S.E.
16. *Lithium Salts.* By H. BOWDEN.
17. *Note on Lithium Nitrate.* By D. B. DOTT, F.R.S.E.
18. *African Copaiba.* By J. C. UMNEY, F.C.S.
19. *A Cheap and Useful Form of Apparatus for the Gravimetric Determination of CO₂.* By J. H. HOSEASON.
20. *Description of an Apparatus for Washing and Draining Precipitates Out of Contact with Air.* By J. A. FORREY.

Presentation from "Bell and Hills' Fund."

Election of Formulary Committee.

Place of Meeting for 1894.

Election of Officers for 1893-4.

There was a mid-day adjournment between 1 and 2 p.m. for luncheon at the George Hotel.

At 4.45 p.m. members and their friends were conveyed by carriages to Wollaton Hall, the English residence of Lord Middleton, the route taken being by way of the Lenton Boulevard, through the Lenton Lodge, and across the Park. Tea was provided on the lawn. By kind permission of his lordship, the whole of the Castle and its adjacent grounds were thrown open for inspection. The visitors showed their appreciation of this act of generosity by taking full advantage of the privileges granted to them.

THURSDAY, 17th AUGUST.

EXCURSION TO THE "DUKERIES." For particulars, see page 486.

BRITISH PHARMACEUTICAL CONFERENCE.

MEETING AT NOTTINGHAM, 1893.

THE Thirtieth Annual Meeting of the British Pharmaceutical Conference commenced its sittings on Tuesday, August 15th, in the Borough Council Chamber, Exchange Hall, Nottingham, Octavius Corder, Esq., in the chair.

The following members and friends were present during the meeting :—

- Aberdeen*—Johnston, John ; Kay, J. P.
- Altrincham*—Unsworth, J. W.
- Arbroath*—Carlow, R. S. ; Jack, James.
- Ashton*—Bostock, W.
- Bedlington*—Foggon, George ; Foggon, Mrs.
- Belfast*—Payne, J. C. C.
- Birmingham*—Gibbs, R. D. ; Perry, G. E. ; Prosser, F. H. ; Thompson, C. ; Thompson, Mrs. C.
- Bolton*—Forbes, J. W. ; Minnerly, Miss.
- Brighton*—Hardcastle, S. B. ; Leigh, Marshall ; Savage, W. W. ; Gibson, W. H.
- Burton-on-Trent*—Ottey, Thomas.
- Buxton*—Wright, R.
- Cambridge*—Elborne, W.
- Cardiff*—Coleman, Alfred.
- Chester*—Baxter, George.
- Clifton*—Towerzey, A.
- Conway*—Williams, W. G.
- Dalkey*—Beggs, G. D. ; Beggs, Mrs.
- Derby*—Hefford, Charles.
- Dublin*—Conyngham, Henry ; Wells, W. F., jun.
- Dudley*—Voce, W. G.
- Dundee*—Kerr, C.

Edinburgh—Dewar, F. L. ; Dobson, A. ; Ewing, J. L. ; Hill, J. R. ; McLaren, David ; Richardson, W.

Exeter—Lake, J. Hinton ; Luxton, F.

Glasgow—Currie, W. L.

Gloucester—Wand, Joseph ; Stafford, W.

Grantham—Whysall, W.

Hitchin—Ransom, F.

Horncastle—Kemp, H. W.

Hull—Bell, C. B. ; Linford, J. S.

Ironville—Greaves, W.

Kendal—Bateson, Thomas.

Leamington—Hutton, H.

Leicester—Bolton, C. A. ; Barford, S. F. ; Butler, E. H. ; Cholerton, A. F. ; Clark, J. W. ; Ough, Lewis ; Shakespear, W.

Lincoln—Birkbeck, J. T.

Liverpool—Bain, J. ; Conroy, M. ; Conroy, Mrs. ; Symes, Dr. C. ; Wellings, W. J.

London—Arkinstall, William ; Arkinstall, Mrs. ; Bird, F. C. J. ; Brembridge, R. ; Burden, E. M. ; Clark, Godard ; Clarke, C. G. ; Clarke, F. ; Collier, H. ; Collier, Mrs. ; Collier, Miss ; Dyson, W. B. ; Dyson, Mrs. ; Gerrard, A. W. ; Hall, H. E. ; Harrison, E. F. ; Holding, John ; Holding, Mrs. ; Hopkin, W. K. ; Humphrey, John ; MacEwan, Peter ; Matthews, J. H. ; Naylor, W. A. H. ; Nightingale, J. C. ; Parry, E. J. ; Paul, Dr. ; Phillips, A. J. ; Rogerson, W. J. ; Sangster, A. ; Strother, C. J. ; Symons, W. H. ; Tanner, A. E. ; Taylor, G. S. ; Want, W. P. ; White, E. ; Wright, T. R.

Louth—Simpson, H. D.

Manchester—Benger, F. Baden ; Cooper, F. R. ; Cooper, Mrs. ; Johnstone, C. A. ; Kemp, Harry ; Pidd, A. J. ; Reynolds, Mr. and Mrs. R. J. ; Scaife, S. ; Twemlow, Richard.

Mansfield—Pegg, A. A.

Melbourne—Reeve, Alfred.

New Barnet—Young, R. F. ; Hayles, B. H.

Newcastle, Staffs—Croydon, E. H.

Newcastle-on-Tyne—Baker, T. B. ; Sharp, W.

Nottingham—Bolton, C. A. ; Beilby, A. E. ; Beverley, R. H. ; Brownsword, A. (Mayor) ; Coates, F. ; Fitz-Hugh, M. L. ; Fitz-Hugh, R. ; Gill, Mr. and Mrs. W. ; Holgate, S. V. ; Holgate, Mrs. ; Lumby, Fred ; Manfield, H. J. ; Middleton, A. ; Rayson, J. T. ; Sergeant, F. Ross ; Shepperley, G. ; Sinclair, N. C. ; Wilford, J. ; Wilford, Anne ; Wilford, Mary ; Widdowson, R. Widdowson, W. ; Wilson, Thomas.

Norwich—Corder, O. (President); Corder, Margaret M.
Oxford—Druce, G. C.
Partick—Rait, R. C.
Queenstown, S. Africa—Mager, W.
Radcliffe—Smith, J. T.; Smith, Mrs.
Reading—Cardwell, E.
Sheffield—Allen, A. H.; Marshall, J.; Newsholme, G. T. W.
Shrewsbury—Cross, W. G.
Southwell—Bennet, George.
Spalding—Bell, E. W.
St. Ives—Barton, H.
Swansea—Davies, John; Davies, J. T.; Grose, H. W.; Hughes, J.
Taunton—Wrenn, W. A.
Uckfield—Farr, E. H.
Uttoxeter—Hurd, W.
Wakefield—Chaplin, Dr. E. M.
Wellington—Bates, James.
West Hartlepool—Watt, G. A.
Whitefield—Sellers, Mrs.
Wigan—Johnson, Thomas.
York—Grierson, G. A.

MEETING OF THE EXECUTIVE COMMITTEE.

A meeting of the Executive Committee was held at the Exchange Hall, Nottingham, on Monday, the 14th inst., at 4.30 p.m.

Present:—Mr. O. Corder (President); Messrs. F. B. Benger and R. Fitz-Hugh (Vice-Presidents); Messrs. Gerrard, Gill, Payne, Wright, and Wilford; Mr. Bolton (Hon. Local Secretary); and Messrs. Naylor and Ransom (Hon. Gen. Secs.).

The minutes of the previous meeting were read and confirmed.

A draft report for presentation at the annual meeting was submitted by the Hon. Gen. Secs., and was agreed to.

The Treasurer's financial statement for the year 1892-93 was read and approved.

A letter was also read from Mr. R. H. Davies, F.I.C., F.C.S., stating that in consequence of ill-health he felt compelled to resign the office of Treasurer. The senior Secretary was requested to acknowledge the letter, and, whilst accepting the resignation, to express the thanks of the Committee for the valuable services rendered to the Conference by Mr. Davies in his capacity of

Treasurer, and to express the hope that he might be soon restored to complete health.

The question of a successor to Mr. Davies was considered. After careful and lengthy deliberation it was decided to approach Mr. John Moss on the subject, and the senior Secretary was instructed to communicate with him forthwith.

A proposed list of officers for the ensuing year was adopted for recommendation to the general meeting for election.

The draft programme for the proceedings of the sittings of the Conference was laid on the table and approved.

The place of meeting for 1894 was considered. Letters were read from Messrs. Druce and Matthews, of Oxford, expressing the hope that the Conference would hold its next sessions in that city.

Mr. J. C. Nightingale was appointed Assistant Secretary in the place of Mr. Johnson, whose resignation was announced at the previous meeting.

The following eighteen gentlemen having been duly nominated, were elected to membership :—

Bateson, Thos., Kendal.	Hurd, Wm., Uttoxeter.
Bennett, G., Southwell.	Mason, T., Nottingham.
Blunt, W. B., Derby.	Matthews, H., Oxford.
Carswell, Thos. R., Bradford.	Pegg, Jas. A., Mansfield.
Coates, F. C., Nottingham.	Phillips, A. J., London.
Daniel, E., Nottingham.	Sergeant, F. Ross, Nottingham.
Dennis, Geo. E., Nottingham.	Thomas, E., Rochdale.
Dewar, F. L., Edinburgh.	Unsworth, J. W., Altrincham.
Hefford, C., Derby.	Watt, Geo. A., Hartlepool.

At an adjourned meeting held on Wednesday, the 16th inst., at the Exchange Hall, at 9.45 a.m., the President in the chair, the Secretaries announced that a reply had been received from Mr. Moss, in which he intimated his willingness to accept the office of Treasurer. It was thereupon agreed to submit his name to the general meeting for election.

The following gentlemen were duly nominated and elected to membership at the general meeting on Wednesday, the 16th inst. :—

Cunningham, Dublin.	Sharp, W., Newcastle.
Davidge, H. N., London.	Symons, A. J., New Barnet.
Kemp, W. H., Horncastle.	Tyrer, C., F.C.S., London.
Mager, W., Queenstown, S. Africa.	Widdowson, R., Nottingham.
Parry, Ernest, B.Sc., London.	

GENERAL MEETING.

Tuesday, August 15th.

The thirtieth annual meeting of the British Pharmaceutical Conference commenced its sittings for business on Tuesday morning, August 15th, in the Borough Council Chamber, Exchange Hall, Nottingham, OCTAVIUS CORDER, Esq., President, in the chair.

Mr. ANDERSON BROWNSWORD, Mayor of the Borough, opened the proceedings by formally welcoming the Conference to Nottingham. He said he was very glad that he was able to say "Ladies and gentlemen," because it was not always at a conference of that nature that they were treated with the presence of the fair sex. He was sure it would add increased zest to the labours of the gentlemen, and would also materially add to their enjoyment. His duties were very brief that morning. He was there merely for the purpose of bidding that Conference a hearty welcome to the town of Nottingham. The body of which they were representatives was to his mind one of the greatest importance. Scarcely any of them knew how much they depended upon the ability and skill of the chemist. Every day some of them had to go to him for treatment, or for medicine to be made up, and it was of vital importance that none should occupy the position of chemists and dispensers who were not thoroughly qualified for the post. The clerk of the weather had given them a most warm welcome, and he trusted they would find the hearts of the people of Nottingham had not only responded to his invitation as it were, but had outdone it and given them quite as cordial a welcome on their own account. He was sure that nothing would be left undone by the local committee to make the visit a successful one. He was glad to learn that the conversazione held on the previous night at the Castle was so great a success, although he regretted he was unable to be present, having returned only late on the previous evening from a short holiday at the seaside. But if not with the members of that Society personally, his sympathies were with them, and he was pleased to know that his friend, Mr. Fitz-Hugh, had acted in his place, and had made every possible preparation for the comfort of the visitors. Twenty-seven years ago, when the Society last visited Nottingham, the offices of local vice-president and secretary were filled by personal friends of his, but both had now passed away to the great majority. However, he was glad to find that one of the positions was filled this year by Mr. Fitz-Hugh, and

the other by a gentleman whose work as secretary would, he was sure, be appreciated by all. He was glad to find from the programme that the bodily comfort and welfare of those attending the Conference had been so well provided for. That was an important point, when many of the members were, like himself, approaching middle life, and he trusted that the programme, as arranged, would be carried through, so that the members would be able to look back upon that visit to Nottingham as one of the most agreeable in the history of the Society. As chief magistrate of the town, he bid them all a hearty welcome, and trusted that the meetings would be attended with great success.

The PRESIDENT thanked the Mayor most heartily for the kind welcome he had given them and for coming amongst them, and also thanked the local committee for the manner in which they had provided for the entertainment of the visitors.

RECEPTION OF DELEGATES.

Mr. F. RANSOM (Hon. Gen. Sec.) then read the following list of delegates :—

Pharmaceutical Society of Great Britain.—Messrs. W. G. Cross (Vice-President), Abraham, Allen, Atkins, Grose, Johnston, Leigh, Newsholme, Richardson, Schacht, Southall, and Storrar, the Editor, Sub-Editor, and Secretary.

Pharmaceutical Society of Great Britain (North British Branch).—Messrs. J. Laidlaw Ewing, P. Boa, W. L. Currie, D. B. Dott, J. Jack, J. Johnston, C. Kerr, A. Kinninmont, R. McAdam, J. Paterson, D. Storrar, and J. Rutherford Hill (Assistant Secretary).

Pharmaceutical Society of Ireland.—Messrs. G. D. Beggs, H. Conyngham, J. C. C. Payne, and W. F. Wells, Junr.

Aberdeen and North of Scotland Society of Chemists and Druggists.—Messrs. Johnston, Kay, and Paterson.

Brighton Association of Pharmacy.—Messrs. M. Leigh, W. W. Savage, and S. B. Hardcastle.

Edinburgh Chemists' Assistants' and Apprentices' Association.—Mr. W. Duncan.

Glasgow Pharmaceutical Association.—Messrs. W. L. Currie and R. C. Rait.

Hull Chemists' Association.—Messrs. C. B. Bell and J. S. Linford.

Liverpool Chemists' Association.—Messrs. J. Bain, M. Conroy,

J. R. Day, J. Hocken, J. Smith, C. Symes, W. Wellings, and A. S. Buck.

London Chemists' Assistants' Association.—Messrs. E. F. Harrison, H. A. D. Jowett, F. A. Rogers, J. C. Stead, and J. Strother.

North of England Pharmaceutical Association.—Messrs. T. Maltby Clague and J. Harrison.

Manchester Pharmaceutical Association.—Messrs. Bengier and Kemp.

Midland Pharmaceutical Association.—Messrs. C. Thompson, R. D. Gibbs, G. E. Perry, F. H. Prosser, H. Hutton, and M. Magor.

Leicester Chemists' Association.—Messrs. E. H. Butler and S. F. Burford.

LETTERS OF APOLOGY FOR ABSENCE.

Mr. Secretary RANSOM reported that letters of regret for non-attendance had been received from Mr. N. H. Martin (Newcastle), Mr. A. Strachan (Aberdeen), Mr. C. Umney (London), Mr. W. Hayes (Dublin), Mr. S. R. Atkins (Salisbury), Mr. D. B. Dott (Edinburgh), Mr. R. Reynolds (Leeds), Mr. G. F. Schacht (Bristol), Mr. T. B. Groves (Weymouth), Mr. R. H. Davies (London), Mr. J. Hodgkin (London), Mr. W. Martindale (London), Mr. E. C. C. Stanford (Dalmeir), Mr. Peter Boa (Edinburgh), Mr. E. M. Holmes (London), and Mr. T. Maben (Hawick). He said that Messrs. Martin and Martindale were visiting the International Conference in Chicago, and he read Mr. Reynolds' letter, in which he expressed his great regret that by his doctor's orders he was forbidden to leave home, especially as Mr. Corder, the President, was his oldest friend.

Mr. W. A. H. NAYLOR (Hon. Gen. Sec.) then read the report of the Executive Committee and the Financial Statement as follows:—

REPORT OF THE EXECUTIVE COMMITTEE.

The Executive Committee, in presenting the thirtieth annual report to the members of the British Pharmaceutical Conference, congratulates them on the continued success of the Association. There is no indication of any decline in the interest taken in the work of the Conference. In looking back over the thirty years of its existence, your Committee feels that there is abundant evidence that the objects for which it was founded have been promoted, and that there is sufficient reason to warrant the belief that an equally useful and important future lies before it. At the

meeting held last year in Edinburgh a resolution was passed declaring that the Conference in future should not of necessity meet in the same town or at the same time as the British Association. The effect of this resolution is to emphasize the fact that the Conference is at liberty to meet at whatever time and place may seem most desirable.

During the past year the Conference has lost by death a distinguished honorary member, Dr. Soubeiran, Professor of Pharmacy at Montpellier, France. Your Committee has also to record with deep regret the death of Mr. Samuel Gale, which occurred in March of the present year. Mr. Gale was an acknowledged authority on pharmaceutical matters, and his long experience on the Board of Examiners of the Pharmaceutical Society of Great Britain brought him into contact with a large body of pharmacists, by whom he was universally esteemed.

The Blue List has been subjected to some slight revision, and contains suggestions for research work on subjects which, it is believed, would amply repay investigation. A grant of £5, in aid of research, has been made to Mr. W. Elborne, B.A., F.L.S., to defray expenses connected with an investigation of *coto bark*, a first report on which will be read at the present meeting.

Mr. R. A. Cripps, F.I.C., who was the recipient last year of a further grant of £5 to assist in carrying out his investigation on *ipecacuanha*, reports that his work is progressing, but is not sufficiently advanced for publication, and therefore asks for an extension of time.

The end of June marked the resignation of Mr. M. K. Johnson as Assistant Secretary, a step necessitated by his entrance into business on his own account at a considerable distance from London. His past service was appropriately acknowledged at a meeting of the Executive by the passing of a formal resolution in terms that recognised his fidelity and devotion to the interests of the Conference, and expressed the thanks of the Committee. It is a pleasure to be able to state that Mr. J. C. Nightingale, who formerly occupied the position for several years, has been appointed to fill the vacancy.

Mr. Louis Siebold, F.I.C., F.C.S., was re-appointed editor of the *Year-Book*, and the MS. of parts I.-IV. inclusive is now in the hands of the printers. Arrangements have been made by which the earlier publication of the volume is assured.

The papers to be read at the meeting are fewer than they have been for some years past, but it is confidently believed that the

quality is such that they will provide suitable matter for profitable discussion.

The reception by the President was held in the Castle Museum and Art Gallery last night, and this, with the conversazione which followed, proved, as usual, an attractive commencement to the business of the Conference.

Your Committee announces with sincere regret that, owing to ill-health, Mr. R. H. Davies, F.I.C., F.C.S., has felt compelled to resign the office of Treasurer. In accepting his resignation, the Committee placed on record its high appreciation of the important service he has rendered the Conference. The Senior Secretary was instructed to convey the resolution, and at the same time to express the hope that Mr. Davies might soon be restored to his accustomed health.

FINANCIAL STATEMENT FOR THE YEAR ENDING JUNE 30TH, 1893.

The Hon. Treasurer in Account with the British Pharmaceutical Conference.

1892.	Dr.	£ s. d.	£ s. d.
July 1.	To Assets forward from last year :—		
	„ Balance in hand at Bank		56 19 2
	„ Cash in Secretary's hands		1 15 6
	„ Messrs. Churchill's Account		97 5 8
1893.			
June 30.	To Sale of <i>Year-Book</i> by Publishers	17 13 4	
	„ Advertisements, 1892 volume	88 5 10	
	„ „ 1891 volume	2 2 6	
		<hr/>	90 8 4
	„ Members' Subscriptions, Amount received from July 1, 1892, to June 30, 1893		462 2 4
	„ Index Book, Sales by Publishers	0 2 4	
	„ „ „ Secretary	0 7 6	
		<hr/>	0 9 10
	„ Liabilities on Outstanding Account, Messrs. McCorquodale & Co.		3 4 6
	„ Unofficial Formulary, Sales by Publishers		4 10 0
			<hr/>
			£734 8 8

1893.	Ca.	£ s. d.	£ s. d.
June 30.	By Expenses connected with <i>Year-Book</i> :—		
	Printing, Binding, Publishing, etc.	296 13 10	
	Postages and Distributing	32 19 10	
	Advertising and Publishers' charges	24 14 1	
	Editor's Salary	150 0 0	
	Foreign Journals for Editor	5 13 6	
		<hr/>	510 6 3
	„ Unofficial Formulary:—		
	Advertising	1 14 6	
	Publishers' Commission	0 9 0	
		<hr/>	2 3 6
	„ Sundry Expenses:—		
	Expenses of Assist. Sec. at Edinburgh	10 0 0	
	Copies of President's Address	0 15 0	
		<hr/>	10 15 0
	„ Assist. Sec.'s Salary from July 1, 1892, to June 30, 1893	42 10 0	
	„ Rent of Office	10 0 0	
		<hr/>	52 10 0
	„ Blue Lists, Printing	3 4 6	
	Postages	2 15 9	
		<hr/>	6 0 3
	„ Postages		12 9 2
	„ Printing and Stationery		9 15 6
	„ Bank Charges, as per Bank Book		0 10 0
	„ Petty Cash Expended		5 3 10
	„ Liabilities of last year, since paid		3 5 6
	„ Outstanding Assets—Messrs. Churchill's Account		85 16 5
	„ Balance at Bank	34 10 7	
	„ Balance in Secretary's hands	*1 2 8	
		<hr/>	35 13 3
			<hr/>
			<u>£734 8 8</u>

* For Postages, 10d.; Petty Cash, £1 1s. 10d.

The Bell and Hills Fund.

1892.		£ s. d.	£ s. d.
July 1.	To Balance in hand	16 1 10	
	„ One Year's Dividend on Consols	9 13 4	
		<hr/>	25 15 2
Aug. 4.	By Purchase of Books for Edinburgh		11 1 5
			<hr/>
			14 13 9
Assets	{ Cash—Balance at Bank	14 13 9	
	{ Consols	360 0 0	

Audited and found correct { T. THOMPSON, Edinburgh.
J. WILFORD, Nottingham.

Mr. WILFORD, one of the auditors, having certified that the accounts were correct,

The PRESIDENT moved the adoption of the report and accounts.

Mr. C. THOMPSON (Birmingham) seconded the motion, which was at once put and carried unanimously.

The PRESIDENT then suggested that a cablegram of congratulations should be sent to the Conference in Chicago, which was carried by acclamation.

VISITORS.

The PRESIDENT said there were two visitors from abroad present, Mr. Alfred Reeve, of the Pharmaceutical Society of Victoria, and Mr. Mager, of the Board of Examiners at Cape Colony. The Conference was pleased to welcome both these gentlemen, and if Mr. Mager had any remarks to make, he was sure they would be appreciated.

Mr. MAGER said it gave him great pleasure to be present, but he had not expected to be called on to say anything at that stage of the proceedings. The Pharmacy Board of the Cape of Good Hope had been established for two years, and consisted of five members elected from the duly registered chemists at the Cape. He had no doubt he should profit from the discussions, and take back much useful information.

The PRESIDENT then gave the following address.

THE PRESIDENT'S ADDRESS.

My friends, I thank you for the courtesy which has prompted you to elect me as your President this year, the more so as I am fully aware that there are many men better qualified to fill the office, and many who could have given you an address more worthy of your acceptance. I find, as others must have done, that every year increases the difficulty of choosing a subject suitable for the occasion, as each former President has well-nigh exhausted every topic bearing upon pharmaceutical interests. Knowing that much time will be taken up in listening to the many and varied papers which have, I presume, been prepared for this Conference, and the discussions which will necessarily follow, let me remind you of the old adage, "That speech is silver, and silence is gold." This week, in the first place, I must inform you

is my jubilee. Fifty years ago I entered upon a term of six and a half years' apprenticeship to obtain a knowledge of pharmacy. Fifty years, roughly speaking, mean in human life nearly a generation and a half, and in that period of time so many changes have taken place that the London Pharmacopœia of 1836, which was then in vogue, is a text-book of a very different character to the Pharmacopœia now in use, which is our standard of British pharmacy.

In those old-fashioned days of fifty years ago, a lad of fourteen would be apprenticed; by the way, much too early an age to study the mystic sign on a specie jar of the Apothecaries' Company, with its one-horned rhinoceros. What that beast has to do with physic I cannot to this day determine, but the world-wide motto "*Operque per orbem dicor*" must be patent to all. Whilst on the subject of apprenticeship, I would remark that the old term of six or seven years was too long a period to follow the short school-life of a boy of fourteen, or fourteen and a half. At the same time, I am by no means sure that the present recognised time of three years does not err on the other hand as too short an apprenticeship to master the requirements of modern pharmacy. For instance, a youth leaves school at the present time at sixteen, and by tacit agreement his indentures are cancelled at the age of nineteen; at this age he is too young to obtain a situation in a first-class establishment, consequently he must be content to enter as a junior, a second or third rate one, where, let it be remembered, there is no sort of obligation to instruct, nor is there time for him to do more than to attend to the duties of his situation. How, then, can the majority of such young men, under these circumstances, hope to obtain the knowledge required for the advanced examinations of this present time? Their future success, as we know, must depend entirely upon themselves. With an improved education much can be done, without it they must fall behind in the race. Raising the standard must of necessity improve the position, but without a thorough knowledge they can never expect, so to speak, to be more than "hewers of wood and drawers of water." For this reason the Board of Examiners have gradually increased the stringency of the examinations so as to meet more fully the exigency of the case. I am aware that in all examinations good men may and do sometimes fail, and indifferent ones occasionally pass; but, taken as a whole, I believe no work is more conscientiously carried out than that of the Board, of which I have been so long a member. It is a

mistaken kindness to pass an unprepared student. Their duty to the candidates, to the Pharmaceutical Society, and above all to the public interest, demand that he should possess a thorough knowledge of pharmacy in all its branches. A deficient early education, a naturally unfitted aspirant for this work, a widespread system of cram have very frequently to be encountered by the Board, so that it is not to be wondered at that sixty or seventy per cent. fail, and even then it is not certain that the result has been "a survival of the fittest." Young men are apprenticed to the business of a chemist because it is thought to be genteel (what a hateful word that is), or that the work is easy and the capital required comparatively small, without duly considering his adaptability for the work.

The subject I have taken for my address is on some herbaceous plants in common cultivation, especially those connected with medicine. I shall offer no apology for choosing this subject, because in the first place I know you will allow me perfect freedom in the matter, and secondly, it does not appear to have been chosen by any former President of the Conference. For this purpose I must take you back to the year 1596, when John Gerard wrote his wonderful "Herbal." I feel, in justice to him, that we must give him the first place in the rank of those who cultivated herbaceous plants, for we must remember that before his time little had been done in that direction. We cannot but feel the greatest admiration for one who succeeded in growing more than a thousand species of these plants in his own garden, somewhere near where Somerset House stands. We look in vain for the site of this interesting old garden, but we can easily imagine the intense interest he displayed in the growth of his treasures, the result of his long tried labours. In those days there were no selected catalogues of hardy or other plants, so that Gerard had to thank himself for the collection of plants which, only by immense pains, he was able to get together. Yet is it not to be wondered at that so little notice was taken of him at the time, and that were it not for his "Herbal" he would probably have passed altogether out of sight, when we remember the host of English worthies who flourished in these halcyon days, such men as Shakespeare, Spencer, Bacon, Cecil Burleigh, Essex, and Raleigh. So we can understand that a mere cultivator of plants would be overlooked in the presence of such great minds.

The bibliophile, however much he may prize "the small rare volume, black with tarnished gold," will scarcely consider his library complete unless it contains a herbal, and from a long list of

such books he would probably choose that of Gerard as the best to adorn his shelves, provided always that he could secure the right edition. This very handsome folio is a fine example of this class of literature, containing, as it does, over 1600 pages of closely printed and almost perfect letterpress, with more than 2000 woodcuts, which, in spite of the early date at which they were produced, could hardly be improved on at the present time with modern appliances. The edition, which, in a collector's opinion, would be considered the "right" one, is dated anno 1633, and is described as follows:—"The Herball or Generall Historie of Plantes. Gathered by John Gerarde of London, Master in Chirurgerie. Very much enlarged and amended by Thomas Johnson, Citizen and Apothecarye of London. London, printed by Adam Islip, Joice Norton, and Richard Whitaker. Anno 1633." As frontispiece it contains a very fine example of the florid style so characteristic of folios of that period, and is the work of John Payne. At the top are figures of Ceres on the one hand and Pomona on the other, below these, on either side of the title, are figures of Theophrastus and Dioscorides facing one another. At the bottom is a portrait of the author holding in his hand the recently introduced potato plant. Although practically unshaded, the drawings are perfect in outline, and the characteristics of each plant are shown with a fidelity and simplicity which enables them to be easily identified; simplicity is a great feature throughout the book. The plan which the author follows to describe each class of plants or even individuals is very definite, first giving an account of the plant under some characteristic heading, which, though it may differ very materially from modern classification, was better adapted to the scanty knowledge of the seventeenth century. Then he gives the habitat and various local and foreign names, finishing with the time of flowering and the various medicinal qualities; of these last he found some for every plant. Many old-fashioned names frequently crop up in his descriptions which may still be occasionally met with in some out-of-the-way corner of England or Wales. For example, "dwale" for deadly nightshade is still used in Devonshire, and Norfolk country people still speak of pumpkins as "millions" and call the holly "hulver." One might multiply instances of these old forgotten names so common three centuries ago, the derivation of which is often very difficult to trace. In many instances they are corruptions of the Latin nomenclature of the monks; one can hardly account for the local name of "sencion" for groundsel, except as a corruption of

Senecio, which was probably derived direct from the monasteries.

The "Herbal" is divided into three books, comprising the whole vegetable kingdom known at that time; these books are divided into upwards of 800 chapters, which, considering the period at which they were written, may be looked on as taking the place of genera. The first book contains all grasses, grains, rushes, reeds, flags, and bulbous-rooted plants; the second, all herbs used as diet, physic, or for ornament and pleasure; the third, trees, shrubs, fruit-bearing trees, resins, gums, roses, heaths, mosses, mushrooms, and sea plants. The misspelling of the author's name on the title-page must be a printer's error. His friends knew him as Gerard, and his coat of arms proves him to be connected with the Gerards of Isley, who did not use a final "e" in their name.

The early history of Gerard is very obscure. He was born at Nantwich in 1545, and educated at Willaston, a village some two miles from that town. It seems very probable that his education was completed there, and that he took up medicine at a very early age. He certainly travelled abroad to some extent, and knew something of Sweden, Denmark, Poland, and Russia, joining a trading vessel to the Baltic, and acting as medical attendant to the crew. He appears to have been familiar with the Mediterranean, and may have made a voyage to that neighbourhood in the same capacity. In 1562 he was apprenticed to Alexander Mason, a Warden of the Barber Surgeons' Company. His connection with the Company dates from this period, and was always a more or less important one. He was made a freeman on December 9, 1569, and though there is no record of his being admitted to the livery of the Company, he is mentioned as a member of the Court of Assistants in 1593, and Junior Warden in August, 1597. Between these dates "he suffered from a most grievous ague, and of long continuance," though it does not appear to have interfered with his work. In August, 1608, he was elected Master of the Company; the books, however, are missing for that period, and there is little or no record of his office. He died in February, 1611 or 1612, and was buried in St. Andrews, Holborn; but no monument marks the spot, even its position being unknown. He must have settled in London some time before 1577, since in 1597 he speaks of having superintended the gardens belonging to Lord Burleigh in the Strand, and also in Hertfordshire, for twenty years, and that this work had taken up nearly all his time, therefore he can hardly have practised as a medical man to any great extent after

leaving Alexander Mason. Previous to his election as a member of the Court of Assistants, he had already acquired a reputation as a skilled herbalist. His connection with Lord Burleigh's gardens gave him ample opportunity to follow his favourite study, and it was largely due to his energy that Lord Burleigh's collection of plants surpassed that of any other nobleman in England, many of them being exotics obtained by Gerard. About this time he appears to have had a house in Holborn, connected with which was a large garden; here he succeeded in growing a great variety of species, both indigenous and exotic.

One can hardly reconcile this quaint old herbaceous garden with the modern ebb and flow of traffic in Holborn. Holborn was then in the outskirts of London on that side, and capable of producing much that would hardly flourish there at the end of the nineteenth century. In the time of Richard the Third there were large gardens connected with the Bishop of Ely's palace, in the neighbourhood; Shakespeare records the fact in Richard the Third by making Gloster say, "My Lord of Ely, when I was last in Holborn I saw good strawberries in your garden there, I do beseech you send for some." This same Bishop of Ely was John de Kyrkeley, who in 1290 bequeathed to the bishopric of Ely all his houses at Holborn in the suburb of London, together with vines, gardens, and other appurtenances in pure and perpetual alms; these gardens are now known as Ely Place. Dr. Sharpe, in the "Calendar of Wills," mentions that the gardens attached to the palace, which survive only in the name of Hatton Garden, were a characteristic feature of the neighbourhood. Vine Street still bears witness to the Bishop's vineyard, as Kirby Street still recalls the Bishop's name. Dr. Bulleyn visited Gerard's garden, and he mentions having seen 1100 varieties of foreign and domestic plants. Dr. Pulteney also says that he saw there 1033 species, though one cannot help thinking that some of these must have been varieties; any way it was one of the earliest botanic gardens in Europe.

In 1596, Gerard printed a list of plants which he had cultivated, this being his first literary effort. Considering the carelessness with which it was printed and the scarcity of the volume (only one being in existence, that in the Sloane collection), it seems very probable that this last was only intended for private circulation, or for his own particular use. This is the first known catalogue of any public or private garden in England, and has therefore an interest beyond its rarity as a book. A folio edition appeared with English and Latin names in opposite columns in 1599.

Gerard was a great advocate for the purchase of a piece of ground for the cultivation and study of medicinal plants, and strongly urged the Company to buy some land for that purpose. A spot in East Smithfield was chosen, but found unsuitable, and it seems just possible this piece of ground may have been Gerard's own garden in Fetter Lane. Some money was subscribed for this scheme, but though one or two meetings were held on the subject of "Mr. Gerard's Garden," no active steps were taken, and the idea apparently fell through. In December, 1597, he published (it is said at his own risk) the folio which has made his name famous, the "Herbal," dedicated to Lord Burleigh. The evolution of this work is an extremely interesting story in the making of such books.

Botany as a science was first recognised by Aristotle, who may be looked on as its founder. The remains of his own writings and those of his school so frequently show a decided knowledge of plants, that it is quite evident they must have been well versed in the vegetable physiology of that day. Theophrastus, a worthy disciple of so great a master, succeeded to his chair, and wrote several books on the history of plants, but apparently he had no idea of classification, since he does not appear to have been acquainted with more than four hundred species in all; such being the case, a classification was hardly necessary. He devoted much attention to the functional difference of organs, the forms of leaves, the peculiarities of the leaf-stalk, and was the first to point out the great differences between the wood of palms and that of exogens. He also understood the importance of leaves in the life-history of plants. Botany made slow progress until the reign of Nero, when Dioscorides, the Greek physician, wrote a treatise on *materia medica*; but of the 600 plants he mentions, the vagueness of description prevents the recognition of more than 400. In his time, however, the sexuality of plants is spoken of in positive terms; this fact Aristotle had refused to accept. Grafting and budding were also well known in Greece and Rome in the first century of our era, and gardening must have been a favourite pastime in Southern Europe, at this early period, to quote from a recent essay: "The garden seems the one spot on earth where history does not assert itself, and no doubt when Nero was fiddling over the blaze of Rome there were florists counting the petals of rival roses at Poestum as peacefully and conscientiously as any gardeners of to-day." Under the later emperors followed by the Byzantine princes, art and science generally decayed, leaving only

a mass of falsehood and superstition, and so from the death of Dioscorides until the beginning of the sixteenth century scarcely any addition was made to botanical knowledge in Europe.

The first herbal in English was the "Grete Herbal," published in 1516 by Peter Treveris, and formed the basis on which all that followed were more or less founded. A little later the Bernese physician, Otho Brunsfels, published his "*Herbarium Vivæ Eiconis*." Previous to its publication the writings of the Arabian herbalists were taken as the text-books for the schools, full as they were of false translations and exaggerated superstitions. Brunsfels appears to us as the Luther of botany, and as the earliest writer who was honestly determined to purify the degraded science, and lift it to its proper position. The Germans or Dutch were the first to illustrate their descriptions of plants, and Brunsfels was greatly instrumental in perfecting that which afterwards became a very prominent feature in the botanical literature of the period. Interest in the reviving science spread very rapidly, and the knowledge of species became much enlarged, to such an extent, in fact, that compilers became necessary to collect the numerous writings on botanical subjects which were scattered through much of the scientific literature of the early part of the sixteenth century. The first of these compilations was made by Conrad Gesner, of Zurich, often spoken of as the German Pliny, who introduced the system of dividing plants into classes, genera and species by distinctions derived from differences in the flower and fruit. Among many great names which occur during the sixteenth century, such as Dodoens, Clusius, Matthias de l'Obel, Gerard and others, we find that of William Turner, the father of English botany. He was born at Morpeth in 1538, and after many wanderings on the continent in consequence of his voluntary exile from England, he ultimately took his degree at Ferrara, and attended the lectures of Ghinus at Bologna. This eminent doctor first started a separate chair for botany, and was the means by which a medicinal garden was founded at Bologna. Turner then went to Switzerland and formed a friendship with Gesner, the compiler, who thought very highly of him. He returned to England, and published his "Herbal" in 1568.

Following in the footsteps of Turner, Henry Lyte published a work in English which was professedly a translation from the French version of the Dutch "Herbal" of Dodoens, this same work forming the groundwork of Gerard's book later on. Lyte described 1050 species and figured 870; most of Turner's illustra-

tions were utilised by him, the remainder being some that appeared in a subsequent work by Dodoens. These illustrations also proved very useful to Gerard. Lyte appears to have entirely used a translation of Dodoens, by Clusius, and was not by any means an original writer in botany. He was followed by l'Obel, who contributed a great deal to *materia medica* and botany, especially the former. He travelled over much of England plant-hunting, and added largely to the number of known species. Under the patronage of Lord Zouch he superintended a physic garden at Hackney, and introduced into England many new exotics. Towards the latter end of the sixteenth century botanists generally felt the want of a trustworthy and comprehensive herbal. That of Dodoens had appeared in 1560, Lyte's translation was published in 1583, but was very erroneous, and Turner's book was practically obsolete.

John Norton, printer to the Queen, had commissioned a Dr. Priest to translate Dodoens' book into English; unfortunately he died before he had completed the task, and by some means the manuscript fell into Gerard's hands, who determined to use it, though there seems little doubt that he did not know sufficient botany for the task. Johnson, who was the editor and collator of this book, says that Gerard was quite incapable of writing a trustworthy herbal. The facts probably are that he used Dr. Priest's manuscript, and to disguise the fact altered the original arrangement of Dodoens to that followed by l'Obel. He denied any knowledge of the work written by Dr. Priest, saying that he had heard of such a man who had been working at a translation of a herbal, but that being dead, his work must have perished with him. The blocks were mostly obtained by Norton from Frankfort. Gerard certainly displayed great ignorance in the original work by misplacing many of the illustrations, and l'Obel, who was asked to correct it, went so far as to say he found in it over 1000 errors; at this point, however, the author stopped criticism by refusing to allow further alteration, saying that the book was quite accurate enough, and that the critic had forgotten his English. In 1597 the "Herbal" was published; however the author may have obtained his material, and whether he ever acknowledged it in the proper way, will not alter the fact that it was vastly superior to any previous publication on botany, and represented an enormous amount of time and labour. Thus in a very sketchy way I have endeavoured to trace the course by which this very remarkable book came to be written. Many names

which influenced the great revival in the science of botany during the sixteenth and seventeenth centuries might and ought to be mentioned, but they are so numerous that one could hardly speak of all.

With Dodoens' "Herbal" as a base, and with additions from l'Obel, Clusius, and possibly some original work of his own, this volume comprised all that was known of botany at that period. It was much more profusely illustrated than any previous work, and coming at a time when some good book was badly wanted, there is little wonder that it became world-famed, and though at the present day the interest that survives is due to the plates or the obsolete ideas as to virtues of various herbs, still we can but admire the patience of a man who, if he was not all original, did the best he could with the material at hand, however obtained, and produced a book which, after nearly 300 years, can still afford some instruction and a great deal of amusement to a more enlightened age. One of his friends, George Baker, "one of the chiefe chirurgions in ordinarie" to Queen Elizabeth, had a high opinion of Gerard's attainments, since he says, "I protest upon my conscience, I do not think for the knowledge of plants he is inferior to any; for I did once see him tried with one of the best strangers that ever came to England, and was accounted in Paris the only man, being recommended to me by that famous man M. Ambroke Parens, and he being desirous to go abroad with some of our herbarists, for the which I was the mean to bring them together, and one whole day we spent therein, searching the most rarest samples. But when it came to the trial, my Frenchman did not know one to his fower." That statement can only apply to Jean Robi, who, in 1597, was appointed keeper to the king's garden in Paris. One can hardly leave this quaint old botanist and his wonderful book without some reference to the numerous anecdotes with which he constantly varies the monotony of his descriptions. Having frequently experimented with the mandrake root, he is quite incredulous as to its shrieking when pulled up, but firmly accepts a more wonderful tale of the goose or barnacle tree, and devotes his final chapter to "this wonder of England." He sums up his great work in this way: "Having travelled from the grasses growing in the bottom of the fenny waters, the woods and mountains, even unto Libanus itself, and also the sea, and bowels of the same, we are arrived at the end of our history, thinking it not impertinent to the conclusion of the same to end with one of the marvels of this land (we may say of

the world).” What he is pleased to call “the naked and bare truth, though unpolished,” vouches for the fact that in the north parts of Scotland and the islands adjacent, called Orchades, there are certain trees on which grow shells of a white colour, tending to russet, wherein are contained little living creatures, which shells in time of maturity open, and out of them grow those little living things which, falling into the water, do become fowls, which we call barnacles, in the north of England brant geese, and in Lancashire tree geese, but the other that do fall upon the land perish and come to nothing.

“Thus much by the writings of others, and also from the mouths of people of those parts, which may very well accord with truth.” “But what our eyes have seen, and hands have touched, we shall declare.” He then relates the story, which I give you nearly in his own language, that on an island in Lancashire where there are numerous wrecks of ships and drifted trees, there is found a certain spume or froth which breeds certain shells, like a mussel, but sharp pointed and white, wherein is contained a thing in form like a lace of silk, finely woven, as it were, together, of a whitish colour, one end whereof is fastened into the inside of the shell, even as the fish of oysters and mussels are. The other end is made fast into a rude mass or lump, which in time cometh to the shape and form of a bird. When it is perfectly formed, the shell gapeth open, and gradually a bird appears, which, falling into the sea, gathereth feathers and groweth to a fowl, bigger than a mallard and lesser than a goose, having black legs and bill or beak, and with feathers black and white. He concludes his marvellous statement by saying it is “spotted in such manner as is our magpie, called in some places a picannet, which the people of Lancashire call by no other name than a tree goose, which place aforesaid, and all those parts adjoining, do so much abound therewith that one of the best is bought for threepence. For the truth hereof, if any doubt, may it please them to repair unto me, and I shall satisfy them by the testimony of good witnesses. They spawn, as it were, in March and April, the geese are formed in May and June, and come to fullness of feathers in the month after.” Gerard himself brought from the Channel Islands to London shells which, on opening, he found in some instances contained living bodies without form or shape, in others which were more mature he found naked bodies shaped like a bird; these he concludes were “the fowls called barnacles.” It is unnecessary to say that the six pairs of feet, found in the third stage of the life

history of the barnacle, are converted into cirri, which are long curling arms fringed with cilia, and are used to attract food to the mouth. These were the feathery objects which Gerard describes. The confusion of the barnacle or bernicle goose with the shell-fish dates from a very early period. Even the monks believed in it, or found it convenient to do so, since the barnacle goose was allowed to be eaten in Lent. They considered it fish, not fowl; and Linnæus perpetuated the error by giving the crustacean the specific name, *Anatifera*, or duck-bearing.

I will now give you a short account of some of the herbaceous plants of general interest. First, *Hellebores*. Of these Gerard appears to have been acquainted with only four species, *viridis*, *fœtidus*, *major*, and *atrorubrens*. Modern horticulture gives a great number which are readily cultivated in our gardens. This genus may be conveniently divided into three—two native species, *viridis* and *fœtidus*, both of which have been employed medicinally, being powerfully drastic and cathartic, the former deciduous, the latter a bushy plant two feet or more in height, with much divided evergreen leaves very distinctly bracteate. Next we have *Helleborus major*, with its several varieties, well known as the Christmas rose, the plant from which the black hellebore of commerce is obtained, a native of Central Europe, long in common cultivation, a well-deserved favourite with all lovers of hardy plants. Thirdly, the various species of the Lenten rose, or oriental hellebores. Conspicuous amongst the oriental section may especially be noted *atrorubrens*, having long and very persistent foliage, with bright purple flowers produced in profusion from January to March; *colchicus*, a rare species from the Caucasus, with deep plum-coloured flowers and large purple leaves; *H. antiquorum*, with pale purple flowers and sepals, beautifully imbricated; *H. gutatus*, a beautiful species with deep green leaves and much expanded white flowers with purple spots; *H. Olympicus*, having large spiny leaves and globular flowers; *orientalis*, white sepals, from which many interesting hybrids have been obtained. The hellebores seed freely, and their well-defined pistils, with the rapid growth of the ovary, quickly form inflated follicles; doubtless all the hellebores vary much in their medicinal activity. Schroff, according to Daniel Hanbury, considers the most potent to be *orientalis*, then follow *viridis* and *fœtidus*, whilst *niger* is of the least medicinal value.

From hellebores we naturally turn to *Aconites* or *Monkshoods*. Of these several species have been long in cultivation. Gerard

was acquainted with most of those known to us at the present time. Perhaps no plant connected with pharmacy deserves more attention than *Aconitum napellus*, the officinal monkshood, especially when we take into consideration that between sixty and seventy varieties are known to botanists, varying from the dark blue of the typical plant to the *albino* variety, almost pure white. A question of great moment arises, that with a plant whose active principle exists in a well-defined alkaloid, how far hybridisation affects the amount of the *Aconitia* present. This plant is one which deserves most careful cultivation; whether the modern pharmacist would be willing to pay four times as much for a definite home-grown root, taking into consideration that the foreign supply is mostly obtained from any species found by the peasants or shepherds who make it their business to dig it at any time rather than the right one, is the reason of my raising this question. *Aconitum Pyrenaicum*, with its bright yellow flowers and handsome foliage, *bicolor*, with white and yellow blossoms, are interesting species in the herbaceous garden. Before dismissing aconites, allow me to suggest that a strange error prevailed. Dioscorides tells us that whilst writing about *Aconitum pardalianches* (a plant, by the way, I am doubtful if it ever existed), "that it killeth panthers, wolves, and all kinds of wild beasts." Theophrastus says "that it killeth cattle, sheep, oxen, and all four-footed beasts within the compass of one day." After a time the old writers, not finding this plant, tacked on *pardalianches* to a *Doronicum* belonging to the natural order *compositæ*, in which there are no plants of a decided poisonous character. So that ill-omened name of "Leopard's bane" may safely be discarded. It is true that the *Pulicaria* or flea bane, and the *Pyrethrum roseum*, destroy insects; but this is owing to the choking up of the spiracles or breathing orifices, so that the tracheæ can no longer convey the air through their system. Salmon, who wrote in his "Herbal" (written about 100 years after Gerard), calls the *Doronicum* the wolf's bane *antidote*, and says, "I think it manifest that the dangerous qualities said to be in this plant are raised only from ignorance of fact and not from any real grounds, for as much as experience has sufficiently proved to the contrary, for I find myself it is an excellent cordial and cures the poison of aconitum and other poisonous plants." This supposed virtue is equally fallacious as that of its poisonous nature.

In the same natural order we have the *Podophyllum peltatum*, or May apple, a plant well worthy of attention, with its palmate

leaves deeply divided, composed of from five to seven wedge-shaped sections bearing one or two large pure white flowers from the axil of the leaves, having a most delicate mixed perfume of cinnamon and clove. The blossoms expand the latter part of May or early in June, and are succeeded by a sub-acid, succulent, edible fruit. The plant is of rapid growth in favourable situations of shade and moisture. Although of recent introduction in European pharmacy, it appears to have been long known to the North American Indians as a valuable medicine. *Actaea spicata* and *Cimicifuga racemosa* must not be passed by without notice. They are both stately perennials, with deeply cut biternate leaves and white feathery flowers, and, as their respective names imply, one in spikes, the other in racemes. *Actaea* is a European plant, whilst *Cimicifuga* has for its native habitat the woods of Canada and the United States. Allied to Aconites, but much surpassing them in beauty, are Delphiniums. These, with little exception, are of modern introduction, *stavisagria* being the only one particularly noticed in old horticulture. At the present time the florist's varieties give us many beautiful herbaceous specimens; many of them are double, blue and scarlet being the prevailing colours. Siberia and the Caucasus furnish us with numerous plants of this genus. *D. cardinale* is a plant of vigorous growth, which attains a height of four feet, has scarlet flowers, with a yellow centre. *D. sulphureum*, Zalil, is an extremely interesting plant from Turkestan; it forms a branching bush three to four feet in height, composed of stiff, wiry stems, which are covered with flowers about an inch in diameter, of the most beautiful sulphur colour, from forty to fifty blossoms on each stem, rendering it one of the most remarkable additions to our list of hardy perennials for many years past.

A few words on poppies. Most of these are annuals, excepting *orientalis* and *bracteatum*, the one orange-coloured, the other brilliant red, both with black spots in the base of each petal. *Meconopsis* furnish us with several strictly herbaceous plants, *Cambricus* giving us a good example, growing almost anywhere with its bright yellow blossoms—an old crumbling wall, a disused gravel path, or any dry corner suits it. We have two Indian species of *Meconopsis*: *Nepalensis*, a fine foliage plant with soft, yellow-green leaves, which have dense rosettes. These in the young state are folded over as a protection to the tender crowns. The flower-stems are from four to five feet in height, producing numerous nodding, yellow blossoms, a native of Nepal. Besides this we have *Walliche*, one of the finest poppyworts in cultivation.

This is remarkable from its being the only blue poppy known to us, growing from four to five feet in height, forming a handsome pyramid, the expanded blooms perfect in shape and colour, with its numerous yellow anthers, form a conspicuous object. The seeds of this plant were sent over by Sir William Hooker from Sikkim, and first bloomed in the Royal Gardens at Kew in June 1852; unfortunately these plants are only biennials. Sir Thomas Brown, a noted physician of the city of Norwich, about 1650, says, "that at times there springeth up of itself in waste ground a red poppy with very long fruit." Some years ago I had occasion to dig a piece of ground in my own garden rather deeply; the following spring I found abundance of this species of poppy, *Glaucium fulvum*; the seeds no doubt had laid dormant in the soil for many years. One other poppy before I pass on deserves special notice, this is the Californian or tree poppy, *Romneya Coulteri*. This is strictly herbaceous, requiring only a little protection to the crown in winter; it forms a strong bush six feet in height, with large, single white flowers, which are not fugaceous, as most of this order. Lastly, amongst the papaveraceæ, let us note *Sanguinaria canadensis*, or blood root. The rhizomes and rootlets are well known in America as one of the eclectic remedies, a charming early spring flower, with its pure white petals and golden anthers. Of Anemones, Gerard figures thirty sorts, many of which are only varieties, as he in all cases places the single and double as distinct species. Since his day many additions have been made to our list of these most welcome spring flowers; especially may be noted *alpina* and *sulphurea*, both robust plants about two feet in height, one white and the other sulphur yellow flowers, followed by fruits consisting of large globular heads of feathered achenes. I know of no plants so impatient of being disturbed when once they have been planted on the rock border. These two rarely survive moving, excepting in the young state.

Apennina, a bright blue species, with *blanda*, the Greek form of it. *Ranunculoides*, a wood-loving species, and doubtful native of this country, of a bright yellow and deeply sected foliage. *Fulgens græci*, from the Morea, is a variety of the south of France *fulgens*, but much larger flowers and brighter colour. *Robinsoniana*, an American variety of our wood anemone, with large, pale, purplish-blue flowers, produced in great abundance from established plants. *Pulsatilla*, or pasque flower, of a deep rich purple, clothed with long silky hairs, the carpels terminating in a curious feathery tuft; found in several places in England, on chalk hills.

Pratensis, an allied species from central France with its variety. *Nigracans*, the officinal plant of homœopathic tincture. *Palmata*, both yellow and white, from the Peninsula, the former with dark green palmate leaves, scarcely rising above the soil. *Vernalis*, a rock-loving species from the high Alps, with white flowers flushed with purple, and brown silky hairs on the calyx. *Japonica*, both red and white, introduced from Japan about fifty years ago, and now well known to all plant collectors, well suited for smoky town gardens; these form but a portion of this genus, all but the two last being spring flowering. Pliny tells us that "the name *Anemone* was given because the flowers never open except the wind doth blow." I now pass on to Felworts (as Gerard calls Gentians); these are all worthy of cultivation. I found in the Engadine, in addition to *lutea*, that *punctata* and *purpurea* were being collected for the sake of the roots; the two latter appeared more intensely bitter than *lutea*. The roots of Gentian contain no starch, sugar and pectin taking its place. In the Engadine and Tyrol they are heaped up in large clamps before they are submitted to fermentation and afterwards to distillation of an aromatic much-prized spirit. Considering the very slow increase of these plants it is not to be wondered that in many places they have become scarce. Indeed, in many parts of the Tyrol they have almost disappeared. We must also remember the many tons of the dried roots which are yearly exported for pharmaceutical purposes all over the world. In our garden flowers we must not forget *acaulis*, with its cushions of glossy foliage and intense blue upright bell-shaped blossoms; *Bavarica*, with small box-shaped leaves and brilliant sky-blue flowers; *verna*, a rare indigenous species, but frequent on all the high Alps, with dense growth and bright blue white-eyed blooms, with a number of others, all of which commend themselves to our notice. Of Rue Worts, *Fraxinella* or *Dictamnus*, a native of Germany, not the *Dictamnus* of old writers, which was an *Origanum* from Candia and Crete. Gerard says, speaking of *Fraxinella*, "that it is a very rare and gallant plant." This I can fully endorse, and consider it one of the best and oldest of our border plants. It is found both red and white, and instances are known where it has outlived three generations of a family without much increase of the plant. It is readily grown from seeds, which have the faculty of frequently lying dormant in the ground before germinating. When this plant is in flower, after a warm, dry day, by putting a lighted match to the inflorescence it becomes a sheet of flame; this is

caused by the large amount of essential oil secreted in the flowers, hence the name given to it of "The Burning Bush."

Crocus and snowdrops; the former is of chief interest to florists for its several varieties of *vernus*, and also for many autumn and winter flowering species. We have several doubtful natives of this genus, but I think we must consider they have been all introduced, though Gerard says, "The Saffron crocus grows plentifully in Cambridgeshire, Saffron Walden, and many other places thereabouts as corn in the fields." He must have meant, I think, that it was cultivated. *Crocus sativus* has a thick fleshy corm, hardly to be distinguished from that of *vernus*, except that the covering scales are more netted. Its primitive home is doubtful, having been in cultivation from very early times. It is mentioned by Homer, Hippocrates, and Virgil, and was introduced into this country in Edward the Third's reign, and for many years largely exported to the Continent. It was grown in Essex for about 200 years, and then slowly dropped out of cultivation; Spain has the monopoly of it now. I have flowered it in my own garden in dry, sandy soil, but have never been able to keep it more than one or two seasons. Under the name of *Leucojum precox minus*, Gerard has our snowdrops, which he calls the bulbous violet. He has also another variety, the Bysantine early bulbous violet; this is doubtless the one we have of recent introduction, and known as the Crimean snowdrop, which he so correctly figured in his "Herbal." The bulb and the two broad leaves, with the characteristic lines in the middle, give no doubt of the identity of the plant; besides, he says, "and Clusius calls it the greater early Constantinopolitan bulbous violet."

The Iris naturally claims our attention, not that the plants are of any particular medicinal value, but rather from the great variety of this genus, all, without exception, being beautiful and interesting plants. They are nearly all quite hardy, and most of them readily grown in town gardens. They are native all through the temperate zones. Robinsoniana, from Lord Howe's Island, is an exception, being half hardy. This plant seems to defy almost all attempts to bloom it in this country. At Kew it has flowered in the temperate house, but excepting this one instance I do not know of any other. The Orris of commerce is supposed to be obtained from *Iris Florentina*, an early variety with lovely white, sweet-scented flowers, but *pallida* and the other varieties of the German Iris are dried in the same way for perfumery uses. Our earliest species, *histrio*, from the slopes of the Lebanon, commences to

bloom in the open ground in February. It is soon succeeded by its close ally *reticulata*, with its delicate violet perfume, and several other rare species from the same source. Unfortunately these Asia Minor Irises have (although but recently introduced) become affected with a fungoid growth which has the appearance of a blue mould. It rapidly destroys the corm, leaving only a dry dust-like powder. All forms of bulbous Irises are subject to this form of disease. *Iris tectorum*, growing on thatched roofs of Japanese houses, requires, as may be supposed, a dry situation for its success; but the Iris of Japan is *kæmferi*, a splendid plant with numerous varieties, requires the margin of a pool or boggy ground. My friend, the late H. B. Brady, told me that he had seen a Jap artizan employing his midday resting time sitting under a large umbrella gazing at his patch of *kæmferi* in full bloom. *Siberica*, as its name implies, a Siberian species, with grass-like foliage and great variations of colour. *Susiana*, or "the widow Iris," with its large black-netted bloom heads, is well worth the care and attention it requires. *Orientalis sanguinea* is one of the best garden species; the buds are red, hence the second half of its specific name. Under the name of Xiphium, or Spanish Iris, a bulbous species, which has been cultivated in this country for more than 300 years, we have a well-known favourite, with flowers varying from white to yellow and blue, one of the best species to grow in all private gardens. Allied to it we have *Iris Anglica Xiphium Latifolium*, of more robust habit than the former. This, also, has every variation of shade in the three colours. These few I have enumerated do not form a tithe of this most interesting family.

A few words on "Daffodils that come before the swallow dares and take the winds of March with beauty." They are favourites everywhere, and with everybody. Our old herbalist, Gerard, has a good knowledge of them, and several of the plates in the "Herbal" are drawn with great care and fidelity, especially those of the reflexed or triandrus section. Since his time, and especially of late years, they have multiplied ten-fold, both in species and varieties. Indeed, so varied are they that it is difficult to determine the former or to trace the parentage of the latter. The southern part of Europe furnishes us with the chief of this genus, although *monophyllus*, and a few others little known, come from Northern Africa, near Oran. This white-hooped petticoat Narcissus (*monophyllus*) blooms at Christmas under glass. In the Pyrenees, the whole of Spain, Portugal, and Italy we find them abundant, both in low-lying pastures and high upland slopes reaching to the

snow, as in the Gerez and Estrella in Portugal. They are conveniently divided into three sections, the *Majus coronata*, which includes the Ajax, of which the native pseudo *Narcissus* of our English woods is a fitting type—this group also includes all the *Corbularia*, which are the hoop petticoat or Medusa's Trumpet; next we have the *medio coronata*, with chalice-shaped crown or cup, half as long as the divisions of the perianth, this also includes all the *Triandrus* or *Ganymedes*; lastly, the *parvi coronata*, known as the small crowned Daffodil, or true *Narcissus*; these have the crown less than half as long as the divisions of the perianth; amongst these we also have the Jonquils, as also all the rush-leaved section and the Tazetta, or bunch flowered *Narcissus*. Unfortunately many of the best varieties, especially the white flowered, are subject to the daffodil disease, the result of fungoid growth, and one which has baffled the attempts of the florist to eradicate; this disease has been but little studied, but its effects are most disastrous. It appears in the first season as a dark brown thumb-like mark on the sides of the bulb. The next year, in addition to that, we find the rootlets are but ill-formed, and in some entirely wanting. The third year the top of the bulb becomes spongy, producing no blossom; then the end has come. The only remedy I have found efficacious is to take up the roots every season, thoroughly drying them for a few weeks, this giving them complete rest. This seems a natural course when we remember that in their native habitats these bulbs become almost dust-dry in the summer months. In the diseased bulbs I have tried with marked success dusting them with fresh lime. This acts in the same manner as sulphate of copper, arsenic or other germicides.

I had intended to carry this subject much further, but the field is so wide that I will not trespass upon your forbearance any longer, and I feel it is not reasonable to expect you all to take the same interest in this subject as myself. A love of plants is inborn, and the circumstances under which we are placed in life foster naturally such a taste. Still, we must all allow that even a very superficial knowledge of botany will much enhance the pleasures both of home and foreign travel.

Mr. FITZ-HUGH (Nottingham) proposed a hearty vote of thanks to the President for his address. He also took the opportunity, as Chairman of the Local Committee, to say how much they were indebted to the local chemists for their assistance in making

arrangements for giving a good welcome to the Conference. He was quite sure that when printed the President's address would be read with much pleasure and profit.

Mr. J. LAIDLAW EWING seconded the motion, and also said he was charged by Mr. Young, of Edinboro', to express his deep regret at being unable to be present, and his hope that the meeting would be a great success.

The resolution was put by Mr. Fitz-Hugh, and carried by acclamation.

The PRESIDENT, in responding, thanked the members for their attention, and for their appreciation of his modest effort. When he was apprenticed, his master, a friend, used to say to him:—"Depend upon it, Octavius, thy love of plants will never lead thee to any good," but the present meeting did not at all tend to verify that prophecy.

REPORT OF THE UNOFFICIAL FORMULARY COMMITTEE.

The following report was read by Mr. NAYLOR:—

To the British Pharmaceutical Conference in Session.

The revision of several of the old, and the introduction of some new formulæ have had the attention of the Formulary Committee since my last report, and as some of them have required careful chemical investigations, which, as will be observed, have resulted in the production of papers for the Conference, the Committee has deferred the issue of a new formulary until these have undergone full discussion.

W. MARTINDALE, *Chairman of the Formulary Committee.*

The reading of papers was then proceeded with.

A REPORT ON COTO BARK. PART I.

By W. ELBORNE, B.A.CANTAB., F.L.S.

The following communication results from inquiries instituted with the object of ascertaining the botanical origin of coto bark.

In the Unofficial Formulary of the British Pharmaceutical Conference,¹ coto bark is described as follows: "A bark of unknown

¹ *Year-Book of Pharmacy and Transactions of the British Pharmaceutical Conference*, 1888.

origin, obtained from Bolivia, in flat or curved pieces about 1 centimetre in thickness, and of variable length. The taste is aromatic and very biting. The transverse section is of a cinnamon-brown colour externally, and darker towards the inner surface." This bark, however, very seldom appears in commerce; a bark, nevertheless, very similar to it in colour, external appearance, and texture, is more regularly met with, but it does not contain cotoin, the active principle of the true coto bark. This more frequently occurring bark, so closely allied in appearance to the true bark, is assumed to be yielded by a tree belonging to the same genus as the plant yielding the true bark, and has been designated paracoto bark, but its botanical origin is likewise unknown.

E. Merck, of Darmstadt, in one of his circulars (1887), remarks as follows: "It may be of interest to know that the real coto bark is very seldom obtainable; whatever appears in the market is para bark.¹ The outside appearance of both kinds is almost the same, and it is only by ascertaining the presence of cotoin and paracotoin that the difference is found. Cotoin, first isolated by Hesse, is a crystallizable substance of the composition $C_{22}H_{18}O_6$; soluble with difficulty in cold water, easily soluble in hot water, alcohol, and ether. Concentrated nitric acid dissolves it, giving a blood-red solution. In the paracoto bark, a too readily crystallizable substance of less active properties is found, which is called paracotoin. This preparation, which corresponds with the formula $C_{19}H_{12}O_6$, turns yellow with nitric acid, and is less soluble than true cotoin. These substances therefore stand to each other in the same relation as quinine to cinchonine. The other ingredients of coto bark are without any valuable properties."

In a private letter dated November 19, 1889, Mr. E. Merck informed me that the genuine coto bark is found, it is understood, in Amazonas, a province of Brazil.

A.

Among the results of my inquiries regarding coto is the following:—In 1885 I forwarded to my cousin at Bogota, among other drugs for identification, some genuine coto bark. The following is abstracted from his letter in reply:—

¹ For a description of paracota bark, cotoin, and paracotoin, vide *Pharm. Journ.*, [3], vii., pp. 495, 1019; x., pp. 521, 541.

Santa Fé de Bogota,
U.S. Colombia,
South America,

Sept. 17, 1886.

. . . . As for the coto bark, no one here has ever heard of such a name for bark, but a botanist out here, to whom I have shown it, recognised it as canelo bark, and says it is yielded by a tree called *Drimys*. The same person says that the *Drimys* grows on the coast of this country, and of Venezuela . . . Coto in Spanish means *goitre*.¹

Yours, etc.,

F. F. NEWCOME.

Upon reference to a Spanish dictionary I found that the word "canelo" was the Spanish for cinnamon, and under the word "canelón," "a kind of bastard cinnamon growing in Bogota, commonly called *Canelon de Santa Fé*."²

The following are other references from works on materia medica:—Canelo, "the name of a bark brought from Chili by Dombey, belonging to a variety of *Drimys Winteri* (natural order *Magnoliaceæ*)."³

"*Le Drimys magnoliæfolia* a aussi l'écorce aromatique, et appelée *Cunelo* par les Espagnols; elle appartient au *D. punctata*, d'après d'autres."⁴

Canelo, "*Drimys magnoliæfolia* *D. granatensis*, and two other species not well known."⁵ Daniel Hanbury, in his classical paper on "Cortex Winteranus,"⁶ alludes to it as follows: "*Drimys Winteri*, Forst., is, however, widely distributed, for according to J. D. Hooker ('*Flora Antartica*,' part II., p. 229), on whose

¹ Coto bark has been used in this country for that affection. W.E.:—"I may add that I suggested its use in a case of exhaustive and uncontrollable diarrhoea in one of the graver forms of *exophthalmic goitre*, which I saw in consultation with my friend Dr. Channing Pearse, of Brixton; and he has since informed me that it not only arrested the diarrhoea, but also appeared to have a remarkable influence in allaying the distressing nervous phenomena associated with the case. I am quite sure that coto bark is a valuable remedy which ought rapidly to come into general use."—J. Burney Yeo, M.D., *Practitioner*, Oct., 1879.

² Neuman and Baretti's "Dictionary of the Spanish and English Languages." Edited by M. Seoane, M.D. 4th ed.

³ *Dictionnaire Universel de Matière Medicale* (Merat and de Lens). Paris, 1830.

⁴ *Loc. cit.*

⁵ "A Supplement to the Pharmacopœia." By S. F. Gray. 5th edition. London, 1832.

⁶ "Science Papers." London, 1876 (translated from the original paper in *Neues Repertorium für Pharmacie*, Band xi., Heft 6, p. 241).

opinion I lay great weight in questions of this nature, the species known as *Drimys chilensis*, DC., *D. granatensis*, Linn., fil., and *D. Mexicana*, DC., are only forms of one and the same plant. We also know for certainty that Winter's bark is not collected in the Straits of Magellan; that the same is collected on the contrary, and moreover is in use, in Chili, where it is known as *canelo*, as also in New Granada and Mexico."

The above quotations show, therefore, that *canelo* is a drug intimately associated with the genus *Drimys*, and that the Bogota district is noted for a certain kind known as "*Canelan de Santa Fé*." I send genuine coto bark to Bogota, where it is recognised as being *canelo*, and the question naturally arises—Is coto bark the recognised *Canelan de Santa Fé*? This question I cannot answer at present, having only quite recently come to the knowledge of the existence of such a bark (4th edition of Spanish dictionary, already quoted).

Being familiar with the specimens of true Winter's bark (a very rare drug,¹ seldom met with outside museums) as occurring in the collections of the Pharmaceutical Society in London and the École Supérieure de Pharmacie de Paris, I did not attach undue significance to my Bogota correspondent's communication, from the fact that neither coto nor paracoto bark possessed the histological structure of Winter's bark (coto barks possess a conspicuously fibrous fracture, Winter's bark a short earthy fracture, both, however, a reddish brown colour and a burning taste). Furthermore, discovering the indiscriminate manner in which the term *canelo*² (*canella*, *Lat.*, *cannelle*, *Fr.*, *canela*, *Ital.*) was applied to

¹ "Although the bark of *Drimys* was never imported as an article of trade from Magellan's Straits, it has in recent times been occasionally brought into the market from other parts of South America, where it is in very general use. Yet so little are drug dealers acquainted with it, that its true name and origin have seldom been recognised. We have seen it offered in a drug sale at one time as 'Pepper Bark,' at another as 'Cinchona.' Even Mutis thought it a cinchona, and called it *Kinkina urens*! . . . It is a stimulating tonic and antiscorbutic, now almost obsolete in Europe. It is much used in Brazil and other parts of South America as a remedy in diarrhoea and gastric debility" ("Pharmacographia," Flückiger and Hanbury, London, 1879).

² *Canela de ema*, *Arundo Phragmites*, L.

Canella, Span. and Port. for *Laurus Cinnamomum*, L.

Canella blanca, Span. and Port. for *Canella alba*, Murr.

Canella do brejo (Rio), Span. and Port. for *Talauma ovata*, St. Hil. (*Magnoliaceæ*).

Canella do brejo (St. Catharina), Span. and Port. for *Nectandra leucothyrsa*, Mss.

Canella do funcho, Span. and Port. for *Mespilodaphne Sassafras*, Mss.

Canella de Ceylon, Span. and Port. for *Cinnamomum zeylanicum*.

designate substances of a pungent and spicy nature, I regarded with much diffidence the clue of coto being known in Bogota as "canelo," and in consequence abandoned it.

Strange to say, however, a subsequent yet totally different line of inquiry (to be considered below in section B) led me again to the same perplexing result, viz., *Drimys*; this accordingly necessitated my resuming the subject of canelo, and I found that a French author had recently been involved in a canella embarrassment. In a most interesting and elaborate thesis¹ on coto bark, Mons. Laborde states as follows: "I ought here to speak of a Lauraceous (? W.E.) bark known as *Canella amargosa*, which M. Sanpaio, a pharmacist at Yaccarchy (Brazil) has had the kindness to forward me, and which in that country is regarded as a coto. After having studied its histological structure, I find in it many points of resemblance to the bark of *Coto-verum*; nevertheless, it cannot be confounded with it on account of its thick suberous layer and absence of sclerenchyma beneath the suber." Being desirous of inspecting this *Canella amargosa* bark, I wrote to both M. Laborde and M. Sanpaio requesting a small specimen of the same, but some years have elapsed without reply. I would here draw attention to a couple of references alluding to a region in Ecuador, in proximity to the districts actually yielding the true coto, mentioned as yielding canelo. In the Hanbury collection in the Pharmaceutical Society's Museum there are specimens of the bark and calyx (labelled Ishpingo) of a tree yielded from the above district; they, however, possess no resemblance to coto, and the tree yielding them is still unknown to science (cf "Pharmacographia," p. 534).²

Canella do mato, Span. and Port. for *Linaria aromatica*, Arrud.

Canella mulatinha, Span. and Port. for *Nectandra amara*, Meiss.

Canella foedorenta, Span. and Port. for *Nectandra myriantha*, Meiss.

Caueila preta, Span. and Port. for *Nectandra mollis*, Nees.

Canella parda, Span. and Port. for *Agathophyllum aromaticum*, L.

Canella sassafra, Span. and Port. for *Mespilodaphne indecora*, Mss.

Canella de veadro, Span. and Port. for *Actinostemum lanceolatum*, Fr. Allem.
—Peckolt, *Pharm. Journ.*, Aug. 4, 1883.

¹ "Etude des Ecorces de Coto," par J. Laborde. Paris: J. B. Bailliére et Fils, 1886. [This work (40 pages) contains good engravings of transverse sections of coto, parasoto and canella amargosa barks.]

² "History of the Conquest of Peru" (W. H. Prescott), vol. ii., p. 142. London, 1847. A cheap edition of this work (containing a map showing the above district) has recently been reprinted by Messrs. Routledge, edited by John F. Kirk, 1890. Stanford's "Compendium of Geography and Travel, Central America" (H. W. Bates), p. 215. London, 1882. [In a chapter devoted to S. American tribes and languages (page 510) *Cotos* is alluded to as "a tribe of the Amazon group, left bank of the Lower Napo."]

B.

At the sixty-second meeting of the Deutscher Naturforscher und Aerzte, held at Heidelberg in 1884, there was exhibited by a Continental chemical firm of repute a collection of fine chemicals and active principles of rare plants, among which latter were the following specimens of coto derivatives:—

- No. 15. Cotoin aus der Bolivia-Rinde, $C_{22}H_{18}O_6$.
- „ 16. Cotoin aus der Venezuela-Rinde.
- „ 17. Dicotoin, $C_{44}H_{34}O_{11}$.
- „ 18. Paracotoin, $C_{19}H_{12}O_6$.
- „ 19. Hydrocotoin, $C_{15}H_{14}O_4$.
- „ 20. Leucotin, $C_{34}H_{32}O_{10}$.
- „ 21. Oxyleucotin, $C_{34}H_{32}O_{12}$.

Samples of the raw materials from which the various plant derivatives had been isolated were also exhibited, including the barks corresponding to the above-mentioned two samples of cotoin. Desirous of increasing my stock of coto specimens, I obtained possession of these cotoins (Nos. 15 and 16) and their corresponding barks: the “Bolivia-Rinde” was genuine coto bark, whereas the “Venezuela-Rinde” was a fine sample of Winter’s bark (*Drimys Winteri*, var. *granatensis*), it being labelled “Coto-Rinde von Merida (Los Andes) Venezuela.” This Venezuela so-called cotoin having been subsequently obtained in exceedingly fine sulphur-yellow transparent crystals, the head of the firm, in consideration of my interest in the subject, kindly forwarded me, unsolicited, a glass tube full of these fine crystals (value 15s.) for my inspection; on their return journey, however, they got lost in the post.

The dissimilarity in structure between coto and *Drimys* barks having already been commented upon, the next point to be determined was whether the so-called Venezuela cotoin (No. 16) was actually cotoin.¹ In taste and physical appearance it resembled cotoin; its qualitative reactions were found to correspond with the published reactions of cotoin,² and it possessed exactly the same melting-point, viz. 130° C.

In 1890 a careful quantitative analysis was kindly undertaken by my colleague (at Owens College, Manchester), Julius B. Cohen, Ph.D., at that time Assistant Lecturer on Chemistry. In a letter

¹ Winter’s bark has not yet been chemically investigated.

² *Pharm. Journ.*, [3], vol. x., 541.

dated May 8, 1890, he writes: "Your substance (Venez. cotoin) has been analysed with the following results: the compound corresponds to $C_7H_6O_2$ almost exactly. No doubt this number should be multiplied by a factor." These numbers multiplied by three give the formula $C_{21}H_{18}O_6$. These results are sufficiently interesting to warrant an extended investigation of this portion of the subject, which I hope in due course to be able to pursue. At the same time it should be borne in mind that in the *materia medica* we have several instances of genera widely separated yielding products chemically identical, so that the possible establishment of any chemical connection between the active principles of coto and Winter's bark would not prove any botanical connection between the plants yielding them; in consideration of the commercial confusion of the two barks in question the facts elicited are, nevertheless, sufficiently remarkable.

The subject of this particular Venezuela bark having been introduced at an evening meeting of the Pharmaceutical Society (London, December, 1890), the following remarks, made by Mr. E. M. Holmes, are very opportune: "Among the specimens presented to the Museum was a specimen of bark and leaves of a tree called 'coto' in Venezuela. These had been examined in Berlin and found to be those of *Drimys Winteri*, var. *granatensis*, and a statement had been published in a German journal to the effect that this tree was the source of coto bark. But this so-called coto bark came from Venezuela, and was quite a different drug to the coto and paracoto barks of commerce, although it had like them a hot or pungent taste. The true coto bark came from the same districts as the coquetta cinchona bark, and the paracoto from the banks of the Mapiri river. The structure of these barks was quite different from that of *Drimys granatensis*, and if a guess might be hazarded, was probably lauraceous rather than magnoliaceous. The name 'coto' was also applied to a rubiaceous tree in Brazil, *Palicourea densiflora*. Indeed, the native name of a drug in South America was not the slightest guide to its botanical source, except in the particular district where it was used. In another province the same name was frequently applied to a totally different plant."¹

Having applied to the museum department of the Pharmaceutical Society for any information that could be supplied me on the subject of coto, I received the following reply:—

¹ *Pharm. Journ.*, December 13, 1890.

" July 28, 1893.

" Dear Mr. Elborne,—There are two or three specimens of coto bark in the museum which possess so much interest that I had thought when cataloguing the Hanbury materia medica collection to make a note concerning them. As, however, you are investigating the botanical source of coto bark, I have much pleasure in giving you the details I possess.

" I. There is in Dr. Pereira's collection of materia medica the following note in his writing appended to a specimen in his series of cinchona barks :—' Bark having a strong flavour of spice and pepper, brought in the ship Salem from Santa Marta (New Granada) with serons or bales of cinchona bark, May, 1852, consigned to Mildred (?) and Co., 9, New Broad Street.' I am not sure that I have spelt the name of the consignee correctly, as the writing is not quite clear.

" This bark is the kind we now know as genuine coto bark.

" II. In the Hanbury collection of materia medica there are three specimens of bark, labelled by Mr. D. Hanbury, '*Cortex Paratodo novus*, (1) imported from Arica in 1852; (2) imported also in 1852; (3) obtained in Bogota by A. J. de Warcewicz and sent to me from Guayaquil. A. J. de W. states that it is a native of Pamplona, New Granada.' The 1852 specimen has the thick character and prominently striated inner surface of paracoto bark. The other two specimens correspond to true coto bark. One of the specimens of true coto bark has the following label attached to it, in Mr. D. Hanbury's writing, '*Cortex Paratodo novus*, according to Dr. J. Martiny, who examined this sample and said that the bark had not been described. This specimen is from two serons of the bark imported from Arica and offered for sale as Winter's bark by C. L. Jenkin, August 21, 1851. I think it fetched 2*d.* per lb.—D.H.' You will thus see that coto apparently first came into commerce in 1851, and that it was, even forty years ago, confounded with Winter's bark, a mistake that is quite natural, since both have a very hot pungent taste, and merchants and brokers in those days knew but little of histology. The paratodo bark of Brazil is generally referred to *Cinnamodendron axillare*, Mart., which has, I think, nothing to do with coto bark, although *Cinnamodendron*, like *Drimys*, has an exceedingly hot, biting taste; but a comparison of the pungent principle of *Cinnamodendron corticosum* with that of coto barks might prove instructive from a chemical point of view.

" III. A specimen of coto bark from Venezuela, with leaves of

the tree, was presented a few years ago by Dr. Schuchardt, of Goerlitz, as the genuine coto. An examination of the specimen showed that this was not true coto, but Winter's bark, and an examination of the leaves confirmed the identification.

"IV. During the past week Dr. H. H. Rusby, Professor of Botany and Materia Medica in the College of Pharmacy in New York, presented this Society with a 'coto' bark and leaves of the plant, obtained by his collector in Bolivia. This comes much nearer to true coto bark, but has less pungency and a distinct bitterness, which I have not observed in genuine coto bark. The herbarium specimen presented with the bark consists only of leaves, which Professor Rusby, after a careful comparison at the Kew Herbarium, refers to the genus *Aydendrone* (Lauraceæ).

"With respect to the histology of Winter's bark, an illustration of the *Drimys Winteri*, var. *Granatensis* (= *D. Granatensis*, L.), is given by Herail and Bonnet, 'Manipulation de Botanique Medicale' (p. 215), pl. xvi., fig. 1.

"Yours very sincerely, E. M. HOLMES."

From the above it seems, therefore, that while "coto" bark under that name was introduced in 1873, the bark itself came into commerce under other names, and was confounded with Winter's bark so far back as 1851.

C.

Owing to the predominant opinion of coto being yielded by a lauraceous plant, the discovery of any new member of that order in proximity to the district yielding coto bark constitutes a desideratum with reference to the determination of the botanical origin of coto. I allude to the quite recent discovery of a lofty evergreen forest tree, a native of the province of Cundinamarca, which is not far from Bogota, and described in the *Pharmaceutical Journal*, June 24, 1893, by Dr. T. Bayou, of the National University at Bogota, as *Laurus giganteus*. The tree in question is stated to yield by incision an aromatic balsam, and the seeds to possess a burning taste like capsicum, whereas the bark of the tree does not yet appear to have received attention.

In conclusion, the amount of active principles yielded by coto and paracoto respectively is approximately as follows:—

Coto bark, from 1.28 to 1.5 per cent. of cotoin.

Paracoto bark, 1.25 per cent. of paracotoin.

" " .012 per cent. of oxyleucotin.

Paracoto bark,	·025	per cent. of leucotin.
"	"	·009 per cent. of dibenzoylhydrocotoin.
"	"	·008 per cent. of hydrocotoin.

The PRESIDENT, in inviting discussion, said he remembered some fifty years ago, when he was apprenticed at Exeter, a large parcel of *Drimys Winteri* arrived, which his fellow apprentice, George Dymond, marked "Cabbage tree bark, found somewhere to the north of Patagonia." This paper, he thought, cleared up the question which in their youthful ignorance they were hardly aware of, whether cabbage tree bark and Winter's bark were identical. He did not know whether that parcel was still in existence. If so, it might still prove useful.

Mr. LAKE said he believed he still had the specimen referred to, but he had never made any examination of it, and could not therefore add anything to the information contained in the paper.

Mr. GERRARD said he remembered some years ago working at a large sample of what was known as ordinary coto bark, for the purpose of extracting cotoin. They then came to the conclusion that cotoin was a mixture of bodies, not a pure substance. He gathered that the author was of opinion that cotoin and paracotoin were the same substance, and if so he should like to ask him if there were any solvents which would differentiate them from each other.

Mr. NAYLOR said he had understood from a conversation with Mr. Holmes that there was a method of distinguishing between the true cotoin and the paracotoin bark by acting on the crude drug with nitric acid. It was interesting to know that Winter's bark yielded a cotoin, and although it did not follow from the analyses yet made that it was identical with cotoin, it might possibly be isomeric with it. It would be interesting to know if any experiments had been made to see if it had the same physiological action as cotoin from the true coto bark.

Mr. ELBORNE, in reply, said the President's remarks about the package of *Drimys Winteri* from Patagonia were of extreme interest, and he should hope to be favoured with an inspection of the bark in question. Mr. Gerrard was no doubt correct in saying that there were two kinds of cotoin in commerce, the ordinary cotoin being often a mixture; but there ought to be no difficulty in obtaining pure cotoin, which crystallized in beautiful large

crystals. He certainly did not intend to convey the impression that cotoin and paracotoin were identical substances, quite the reverse; in fact, the paracotoin did not contain the active principle at all; it yielded a more readily crystallizable substance which was not pungent, was altogether distinct from cotoin, and had a different formula. With nitric acid cotoin gave a blood-red colour, and paracotoin a yellow, and that was a ready test for distinguishing the barks. Probably the best method of making the test would be to make an alcoholic extract of the bark, evaporate to dryness, and then apply the acid. The physiological action of the active principle yielded by the Venezuela bark had not yet been tested; he had only recently taken up the matter, and as yet a sufficient quantity had not been obtained to allow of this to be done. He had only about $\frac{1}{2}$ gramme for exhibition at this meeting, but he hoped at some future time to be able to prepare enough for comparative experiments to be made.

A vote of thanks was passed to Mr. Elborne for his paper.

The next paper read was—

PHARMACEUTICAL EDUCATION IN NOTTINGHAM.

BY PROFESSOR FRANK CLOWES, D.Sc., LOND.,

Professor of Chemistry in the University College, Nottingham.

A request having reached me from official quarters to prepare a paper for the British Pharmaceutical Conference meeting in Nottingham, I felt bound to make a practical response, and, in selecting a subject, my desire was that the paper should treat of something distinctly local in its character and yet capable of arousing general interest amongst the members of the Conference. No subject appeared to possess these two qualifications in the same degree as that which has been finally selected, and selected, I may say, with the full consent of the deputy-mayor of this town and of the energetic honorary local secretary, to both of whom local pharmaceutical education largely owes its development, if not its birth.

My acquaintance with the educational work carried on in Nottingham dates back some twelve years. Coming into the town as one of the original professors of the University College, I found more than enough to do in founding and organizing the chemical department of that College. Of systematic chemical education there had been but little existent before the College

was started, but that state of things has been improved upon largely by the desire of the inhabitants, but largely also owing to the fact that the superior equipment and staff of the College, and later on of the secondary schools, provided the means of imparting chemical instruction in such a way as had never before been possible.

But there had existed for many years before the foundation of University College, an association which practically corresponded to one of the ancient trade guilds—an association whose object it was to fully equip educationally the young pharmaceutical chemist for his future career. I refer to the Nottingham and Notts' Chemists' Association. Of the constitution of this Association I need say only this, that it subsisted mainly on the funds supplied by the master pharmacentists already established in the town, the money thus contributed being mainly spent on educating their youthful assistants and apprentices. The teaching work was undertaken by members of the Association best qualified by their superior knowledge, and by their power of communicating it, to educate the younger men, and from all I can hear the teaching and learning was carried on, not only with much regularity and system, but also with much enthusiasm.

When the University College started, the Managing Committee of the Chemists' Association saw their opportunity of further improving their course of instruction. They decided to transfer their classes to the College, and to place the teaching in the hands of the College staff. I have a very vivid recollection of an interview which took place between delegates sent from the Chemists' Association Council and the new Professor of Chemistry, in which the Professor was sounded as to his willingness to take charge of a special class in pharmaceutical chemistry, and, if possible, to arrange for the teaching of other scientific subjects, a knowledge of which was necessary to the pharmacist. It is almost unnecessary to add that the Professor rose to the occasion, and that the classes were soon earnestly at work in their new quarters. A recent experience of German university life, perhaps, led the Professor to look to the very thorough training there given to the *Pharmaceuten* as the ideal to be aimed at. In these universities the young pharmacist gives his whole time for at least two years to instruction in chemistry, physics, botany, and other necessary subjects. This teaching is not interfered with by any business except the much-dreaded compulsory military service. This ideal may be a good one, but an experience of nearly twelve years has

shown it to be impracticable in this time and in this place. And it may be stated at once that there are advantages (even though there are also disadvantages) in spreading the instruction over a longer time, and allowing it to be given to young men already engaged in their life-business. The main advantage is that they obtain by this system a practical interest in their education, which they can scarcely feel when they have not any experience of its necessity and of its application. The main disadvantage is that their working time is frequently too much monopolised by their business; and they are thus left to pursue their education when weary and jaded, and they really have to devote time which should be spent in rest or in wholesome recreation to the attempt at serious study.

However, I am anticipating by introducing thus early the fruits of experience. We soon found that so great a revolution as the immediate introduction of the German pharmaceutical course into Nottingham was not to be thought of for a moment. And I may say at once that I for one am not wholly disappointed by this discovery. As a rule, much more satisfactory results are arrived at by working out a system of education suited to the country and the locality in which it has to be given than by adopting the ready cut-and-dried system of another locality, and especially of a foreign country. And I am patriotic enough to believe that, while we may learn much from studying carefully all educational systems, even those of foreign countries, and although such study may show us that we are much behindhand in our own system, Englishmen will, if left to their own devices, slowly and patiently work out an improvement on their own methods which will be in every sense more satisfactory than a wholesale adoption of those of others.

It is such a development of our own English methods which I believe has been going on slowly and gradually in our pharmaceutical classes in Nottingham. The result is briefly this: we have now a three years' course of instruction given at the College, which embraces pharmaceutical chemistry, both practical and theoretical, pharmaceutical botany, materia medica, practical dispensing, and physics, both theoretical and practical. This course prepares a student fully for the Minor examination of the Pharmaceutical Society, whilst arrangement is easily made for his continuing his study for the Major examination if he desires to do so. The amount of time which each student devotes to his work at the College is not large, probably not so large as it should be; but

it has enabled many to pass their qualifying examination without further aid, if they are of a studious character. And it must be remembered that although much of their time is spent away from the College, such time is spent in learning their business, and in ensuring that they shall be practical men and not mere book-worms or theorists.

That the system at present at work in our College is perfect and entirely satisfactory, no one of us would claim or even hope. But that it has gone a long way towards showing the way to secure the decentralisation of pharmaceutical education, and towards combining satisfactorily the student's training with the business training of our young pharmacists, I think it would be impossible to deny. It should be possible for young would-be pharmacists in our larger towns to obtain slowly, and in a way in which they can thoroughly digest and assimilate it, the education they require. They should not be forced to reside for a period all too brief in our great metropolis, and there be fed with highly concentrated educational food in doses far too large to permit of its digestion and assimilation. This is usually the only alternative to laborious and discouraging private study in their provincial home, since the very admirable metropolitan college is only available to such as are occupied in business in the metropolis in a sufficiently accessible neighbourhood, or to those who can either obtain one of the few available scholarships, or can afford to live the life of students for two or three years without earning at the same time their daily bread. The latter class, I need scarcely add, is an extremely small one, and may almost be left out of consideration. Is it too much to hope that in the many provincial centres which now possess university colleges and technical schools, something of a kindred nature to that successfully attempted in Nottingham may be done towards helping the education of young pharmacists? and that thus the decentralization of education, already so far advanced in other branches, may become a reality also in pharmaceutical training.

It will be seen at once that success in the direction indicated implies the hearty co-operation of the pharmacists and of the teachers in each centre. This has been fortunately secured in Nottingham. And the gentleman who has perhaps most largely led to the result is our present deputy-mayor, who was at the same time President of our Chemists' Association and Vice-Chairman of our University College Committee. It is necessary to add that Mr. Fitz-Hugh's success was largely due to his being the repre-

sentative of, and to his being loyally supported by, other members of both the Councils over which he presided. It will certainly also be possible to mention, without being suspected of having made any invidious selection, the name of Mr. Bolton as having been active in this scheme. But I should also wish to chronicle the names of Professor Blake, M.A., Mr. Carr, M.A., Mr. C. Haydon White, M.R.C.S., Professor Heaton, M.A., and of Mr. Sargeant, who have one and all as teachers done their utmost to further the scheme of pharmaceutical training in our local college. The experiment has now almost passed beyond the experimental stage. We shall undoubtedly continue to improve the course, but the work already done is such as not only pays in examination, but pays also in a sense which is far higher and more satisfactory. It makes our pharmacists thoughtful and sincere; it abolishes a sham education in favour of a more real one, and it tends to give that higher tone of mind and character which is obtained by association with those who are studying truth and knowledge for their own sake, and not merely in order to secure the substantial rewards which they may bestow.

I have been privileged year by year to hear the remarks of some of the examiners at Bloomsbury Square, before whom these young men have to present themselves; and, casting aside all that must be taken as unduly appreciative and complimentary to us as teachers and originators of our scheme of training, I can assert without undue pride or satisfaction that the examiners undoubtedly detect in many of our candidates the advantageous results which I have already laid claim to.

Is it too much to anticipate that, with the growth of a widespread and properly organized system of education, leading up to a suitably high examinational standard (now, let us hope, attained at last), the status of the English pharmacist may be recognised as it is already recognised in continental countries, and that many of the serious troubles which beset him may become things of the past?

The President said he would tender the thanks of the meeting to Professor Clowes for his thoroughly practical paper. There was no need to discuss it, but it exemplified what had been already hinted at, that men who obtained their training at such schools or colleges as that at Nottingham could easily be detected when they came into the examination room at Bloomsbury Square. Men who had had a three years' course of study must occupy a much higher

position than those who had only three or four months, and many could not afford more. Still, if men really had a desire to study, there was no difficulty in carrying it out. The great difficulty was to arouse the desire; it was all right to have time for pleasure and relaxation, but during a three or four years' apprenticeship some definite time should be devoted to serious study.

The two following papers were read by the respective authors and discussed together.

NOTE ON COLLODIUM BELLADONNÆ.

By R. WRIGHT,

Pharmaceutical Chemist.

The above preparation, as originally introduced by Dr. H. Miller, and prepared by Messrs. T. and H. Smith, of Edinburgh, was a solution of an alcoholic extract of belladonna leaves in collodion and spirit of camphor.

On its inclusion in the Conference Formulary in 1891, the alcoholic extract of the root was substituted for that of the leaves, the idea being that as the root extract had been introduced into the British Pharmacopœia as a substitute for the green extract previously employed, it would be likely to be equally serviceable for the preparation of the fluid as for the solid plaster.

Such, however, has not proved to be the case; and the formula, as it now stands, is probably less satisfactory than any other included in the Formulary.

The process was criticised by Conroy in a note read before the Liverpool Chemists' Association (*Pharm. Journ.*, [3], xxii. 327). He showed that, when the official root extract was employed, only about one-eighth of the extract and two-fifths of the alkaloid were dissolved.

By using a rectified spirit extract slightly better results were obtained, about one-fifth of the extract and three-eighths of the alkaloid passing into solution.

The statements of Conroy as to the unsatisfactory nature of the preparation were corroborated by J. C. Umney (*Pharm. Journ.*, [3], xxii. 364). According to Umney, the results obtained with an alcoholic extract of the leaves were little better than with the root extract. Of three samples of leaf extract employed, one was soluble to the extent of 85 per cent.; the two others to the extent of 21 and 38 per cent. respectively.

From these results it is evident that the Formulary recipe will need revision, and this being the case, it appears to me to be an opportune time to raise the question as to whether, seeing that the reputation of this medicament was made upon a leaf preparation, it would not be advisable, in a future formula, to go back to the leaves as the source of the extract. The chief objection to the employment of a leaf extract for the preparation of the solid plaster was the soiling of linen through the running of the plaster; but this objection does not apply to the collodium belladonnæ, seeing that the green colouring matter is fixed by the collodion. If the leaves are employed, either a solid or liquid extract, prepared with strong alcohol, will have to be made the basis of the preparation. As the result of several experiments and estimations, I find that it is quite possible by repercolation to prepare a fluid extract of belladonna leaves sufficiently strong to warrant its employment for the preparation in question. The following is therefore suggested as an improvement upon the existing formula.

(a) Take of—

English belladonna leaves in fine powder . 1 pound.
Rectified spirit . . . a sufficient quantity.

Moisten half a pound of the powdered drug with menstruum, pack in a conical percolator, add a further supply of menstruum, allow percolation to proceed, and collect the percolate in three fractions of six fluid ounces each. Moisten the rest of the powder with a little of the first fraction of percolate, pack in a second percolator; pour over it the remainder of the first fraction of the percolate, and when that is absorbed, add the second fraction, and finally as much of the third fraction as may be required to produce eight fluid ounces of percolate.

This fluid extract should contain not less than .5 per cent. alkaloid.

(b) To produce collodium belladonnæ :—

Take of—

Fluid extract of belladonna	
leaves	10 fluid ounces.
Pure ether, sp. gr. 720	10 „ „
Camphor	180 grains.
Pyroxylin	183 „
Canada balsam	365 „
Castor oil	183 „

Mix the fluid extract of belladonna with the ether, and add the other ingredients. Set aside for a few days, and then decant.

LIQUID BELLADONNA PLASTER.

BY W. A. H. NAYLOR.

The formula from which this preparation is directed to be made as given in the B.P.C. Unofficial Formulary has been subjected to experimental criticism, with the result that an alteration in its construction is urgently needed.¹ Conroy has demonstrated by actual experiment "that taking the alkaloidal content as the basis of valuation more than one-half is wasted," and J. C. Umney² has supplied analytical data that evidence wide differences in strength in the alcoholic extract of belladonna root of commerce. Judged by these two sets of experiments alone, the formula as it at present stands cannot by any method of compounding be made to yield a satisfactory product. In the absence of any record of analytical results from which a working formula could be devised or built up, I venture to submit a few facts that have been verified by me several times, and also to present an improved process for the manufacture of this preparation. Any process that claims to be efficient must, in my judgment, meet the following requirements: It must be one which withdraws the whole of the alkaloidal content from the crude drug and introduces it with a minimum of loss into the final product. Further, the solvent selected must be such as not only admits of the dissolution of the active principle or principles in their state of natural association, but also withdraws a maximum of extractive.

It will doubtless be conceded that the article in demand is one made from the leaf and not the root of belladonna, and I therefore recommend the substitution of the former for the latter. A selection from a number of experiments made by me may now be briefly outlined, and their results summarised. Five distinct extracts were prepared—one from absolute alcohol, two from alcohol of 94 per cent., one from rectified spirit (84 per cent.), and one from alcohol of 65 per cent. In each case the leaf was reduced to No. 20 powder and percolated with its menstruum until deprived of its alkaloidal principle. After recovery of the spirit by distillation, the residue was evaporated over a water-bath to the consistence of a stiff extract. One of the two extracts from the 94 per cent. alcohol was washed to exhaustion with water. The several extracts were next examined for alkaloid by Dunstan and Ransom's method, and their moisture determined by loss at 212° F.

¹ *Pharm. Journ.* [3], xxii. 327.

² *Ibid.* [3], xxii. 361.

The following table sets forth the result :—

Menstruum.	Per cent. yield of moist extract.	Per cent. of mois- ture in extract.	Per cent. of dry extract.	Per cent. of alkaloid calculated on dry extract.
1. Alcohol absolute	6.86	20.48	5.45	4.06
2. „ 94 p.c.	12.32	16.36	10.30	3.33
3. „ 94 p.c., washed . .	2.00	4.5	1.99	.52
4. „ 84 p.c.	9.00	14.59	7.68	4.53
5. „ 65 p.c.	31.25	21.06	24.66	2.30

The next step was to ascertain the solvent capacity of a mixture of ether and rectified spirit in the proportion of three volumes to one on the series of extracts.

No. 5 extract contained too large a proportion of extractive soluble in water but insoluble in the ether-spirit mixture to be of service for the purpose required. Moreover, the brown extractive retained the larger portion of the total alkaloid.

No. 3 dissolved all but completely in the ether-spirit mixture, and in the proportion of four ounces in the pint, including the official quantities of camphor, pyroxylin, castor oil, and canada balsam, gave a product that, for elegance, left nothing to be desired. Inasmuch as the process is wasteful of active principle and expensive, it cannot be recommended without being open to the taunt of bad pharmacy.

No. 1 was soluble in the test mixture to the extent of little more than one-half. Here, again, the cost of production forbids its use unless a less expensive and equally potent and soluble extract is unobtainable.

No. 2 extract: 53 grains equivalent to 44.32 grains dried at 212° F. were treated with 1 ounce of ether-spirit mixture, warmed, shaken at frequent intervals, and set aside for twenty-four hours to deposit. In an accurately measured quantity of the bright supernatant liquid the alkaloid was determined, and in a second quantity the amount of extract yielded on evaporation and drying of the residue at 212° F. The figures obtained showed that the equivalent of 10.97 grains of dry extract had passed into solution, giving by difference 33.35 grains as the weight of the insoluble residue. Practically only one-fourth of the extract was dissolved by the mixture. The result of the alkaloidal determination showed that .65 grain had passed into solution, leaving by difference .82 grain as the amount retained by the undissolved residue.

No. 4 extract: 40 grains of moist extract equivalent to 34.16 grains dried at 212° F. yielded up to the ether-spirit mixture the equivalent of 13.25 grains of dry extract, leaving by difference 20.91 grains as the weight of the undissolved portion. Of the total alkaloid, 1.548 grain, it was found that only .403 grain had passed into solution, the remaining 1.145 grain being retained by the undissolved extract.

	No. 3 extract. Grains of dry extract.	No. 4 extract. Grains of dry extract.
Weight of moist extract taken equivalent to .	44.32	34.16
Weight of extract dissolved by ether-spirit mixture equivalent to	10.97	13.25
Weight of undissolved extract by difference .	33.35	20.91

	No. 3 extract. Grains.	No. 4 extract. Grains.
Weight of alkaloidal content present in extract taken	1.47	1.548
Weight dissolved by ether-spirit mixture . .	.65	.403
Weight of undissolved alkaloid . . . . .	.82	1.145

These results reveal the fact that the mixture of ether and spirit 3 : 1 to extracts in the proportion here used is an incomplete and insufficient solvent of the active principle of the latter, regard being had to the complex character of the substance with which the alkaloids are associated. From other estimations that were made it was evident that the proportion of spirit to ether would require to be largely increased if the final product were to represent the potency of either one or other of the extracts. The best results were obtained by using a mixture of equal volumes of rectified spirit and ether. In support of this statement the following examples may be cited:—

	No. 4 extract.	
	Grains.	Grains.
Weight of alkaloidal content present in ex- tract taken	1.548	1.7415
Weight dissolved by ether-spirit 1 : 1	1.426	1.5245
Weight of undissolved alkaloid . . . . .	.122	.2170

The dry extract per fluid ounce amounted to 27·52 grains, and the undissolved extract to 6·64 grains.

Trial was made of the formula suggested by Mr. Linford, only substituting leaf extract for root:—

Ext. belladonnæ (Fol)	. . . . .	.35.
Spt. camphor . . . . .	. . . . .	3iiss.
Liq. ammon. 880 . . . . .	. . . . .	3ij.
S. V. R. . . . .	. . . . .	3iij.
Ether rect. . . . .	. . . . .	3 × ij.

The preparation after standing forty-eight hours gave a deposit that weighed 132 grains, and when assayed yielded 1·08 per cent. of alkaloid. The extract used contained 2·69 per cent., so that roughly a little more than one-half of the active principle had passed into solution.

As a direct process, without the intervention of an extract, was greatly to be desired, a given quantity of leaf in fine powder (about No. 60) was treated with rectified spirit by a method of repercolation, so that 1 part by measure of the final product should represent 2 parts by weight of the drug. The marc was afterwards exhausted by percolation with rectified spirit and the percolate distilled and evaporated. The resultant extract per pound of leaf weighed 304 grains, and assayed 3·83 per cent., or 11·64 grains of alkaloid. The 8 fluid ounces of spirituous solution contained 14·63 grains, so that 55·68 per cent. of the total alkaloid had been removed by this process of repercolation. It does not therefore appear probable that a preparation of a strength 2 in 1 can be made by a direct method which will contain a proportion at all approaching to the totality of alkaloid present in the leaf. Discarding, therefore, the idea of obtaining a spirituous preparation without evaporation that would be satisfactory and of the strength required, two courses of procedure are open for adoption. Either the whole of the percolate from a given weight of leaves may be reduced by distillation and evaporation to an extract to be subsequently redissolved in the prescribed quantity of a mixture of spirit and ether, or a specified fraction of the percolate consisting of that first collected may be reserved and the extract from the remainder added thereto. As the latter method would be regarded as less objectionable than the former, I have framed my formula according to its principles. It is as follows:—

Liquid Extract of Belladonna.

Take of—

Belladonna leaves in No. 60 powder . . . 20 oz.
 Rectified Spirit, a sufficient quantity.

Moisten the powder with 15 fluid ounces of the spirit, pack it tightly in a percolator, and pour on sufficient menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop, close the lower orifice and macerate for twenty-four hours; then allow percolation to proceed, gradually adding menstruum until the belladonna is wholly deprived of alkaloid. Reserve the first seven ounces of the percolate, distil off the spirit from the remainder, and evaporate the residue to a soft extract; dissolve this in the reserved portion, and add enough menstruum to make the liquid extract measure 10 fluid ounces.

Liquid Belladonna Plaster.

Take of—

Liquid extract of belladonna . . . 10 fluid ozs.
 Ether. 10 "
 Camphor 130 grains.
 Pyroxylin 183 "
 Canada balsam 865 "
 Castor oil 183 "

Mix the liquid extract and the ether, and set aside for twelve hours. Decant and dissolve therein the remaining ingredients in the order in which they occur in the formula.

The liquid extract of belladonna, which was prepared from English leaves, had a specific gravity of .944, and contained 1 per cent. of alkaloid, or 4.154 grains per fluid ounce. The mixture of equal volumes of the liquid extract and ether, after decantation, had a specific gravity of .800, and contained .439 per cent. of alkaloid, or 1.534 grain per fluid ounce. In the preparation of the liquid extract it is prudent not to carry percolation beyond the point that suffices for the removal of the alkaloid, otherwise an unnecessary quantity of semi-liquid extractive of a brown colour will also be removed, which will be thrown out of solution on the addition of the ether. Further, the extractive will carry down with it a sensible quantity of alkaloid. If it be objected that a large portion of the dissolved matter of the liquid extract separates out on the addition of the ether, the answer is that the proportion retained in solution represents, under the conditions that obtain, the maxi-

mum solvent power of the mixture. It does not seem practicable so to vary the conditions as that a larger proportion of extract and alkaloid shall be maintained in solution, and the mixture, at the same time, shall act as a suitable and complete solvent of the remaining ingredients of the formula.

The PRESIDENT said the large amount of extractive matter which was obtained in percolating the fluid extract of belladonna led him to ask the question whether a definite solution of atropine could not take its place.

Mr. LINFORD said the idea had occurred to him during the reading of the paper that the loss of alkaloid might be prevented by powdering the dried leaves sufficiently fine and then percolating with a mixture of two parts ether to one of spirit, having previously rendered them alkaline by ammonia. Atropine was perfectly soluble in ether and spirit, and therefore if the powdered leaves were percolated in such a mixture and the leaves subsequently exhausted by another addition of rectified spirit, and it were then evaporated to an extract, and then the pyroxylin and other materials were dissolved in the liquid which first came through, he thought it would be a most efficacious method of making the compound in question. He had a series of stone percolators, with glass tubes and clips in the bottom, and percolating through a series of six he found very little further evaporation was required. If properly dried belladonna leaves were treated in this way, he believed nine-tenths of the alkaloid present would be extracted.

Mr. WRENN thought this paper ought to receive the most careful attention of every pharmacist. The only way to prevent the spread of American perforated plasters would be the use of fluid plaster. There were two things to be considered, the convenience of the patient and the efficacy of the medicament, and from the former point of view he thought it was imperative to omit rather than add anything which did not exist in atropa belladonna. Canada balsam and castor oil should, in his opinion, not be added. He made his liquid belladonna plaster, he must admit, from the green alcoholic extract, in which there was a great waste of the alkaloid obtained, and he would suggest the advisability of taking the succus belladonnæ as the basis of operations. The alkaloid there, with its attendant acid, if carefully evaporated almost to dryness and treated with a mixture of equal parts of alcohol and ether, and the subsequent addition of camphor and pyroxylin,

formed one of the most potent and acceptable preparations of belladonna for external use. He should like to ask Mr. Naylor if he had ever made an extract from the fresh belladonna plant, and if so what was the alkaloidal value. He had found that method answer very well.

Mr. DRUCE said he was glad to hear what had been said about the difference between English and foreign dried leaves. This point was drawn to his attention very forcibly some years ago, when a doctor whom he knew, in ordering tincture of belladonna for a child, had to increase the dose up to 2 drachms, and then stopped for fear of alcoholic poisoning rather than atropine. He had been using a German tincture, which was, in fact, practically valueless, and came to him for a *bonâ fide* tincture. This was in November, and as there were some plants growing in the Botanic Gardens, although there had been some sharp frosts, he gathered some leaves, dried them carefully, and did his best to produce a good tincture. He suggested to the doctor that he should begin with a small dose, and he found that five drops were quite sufficient to produce the effect he desired. He thought such preparations should be made with as few evaporations as possible. He should gladly welcome the standardization of the tincture of belladonna, and thought the alkaloidal strength might be fixed at .025.

Mr. CONROY said when he criticised the formula some time ago he went very fully into the matter, and in a letter to the *Pharmaceutical Journal*, Mr. Linford recommended the use of ammonia in making the extract to free the alkaloid. He had intended carrying out further experiments on the matter, but had been prevented. During the reading of the papers the idea had occurred to him that it would be still better to make this article after the style of chloroform belladonna, viz., to employ the powdered root, add ammonia to it, dry it so as to free the alkaloid, and then to percolate that with the menstruum necessary for making the collodium. He thought they would get better results on those lines than on any other, and he should certainly prefer the colour of an article so prepared to that of the dark green extract.

Mr. RANSOM said he was about to have made a similar suggestion to that of Mr. Druce, and thought perhaps this would be a good opportunity for introducing a standardized liquid extract, and such a one could be easily prepared. The alkaloids, atropine and hyoscyamine, although they varied to some extent, were similar in their action, and a standardized preparation of belladonna could be prepared more easily than one of many other drugs. If it could

be made in the form of a liquid extract, it would be useful for many other things besides the preparation of collodium. He thought galenical preparations should contain the alkaloids in their natural combination with acids, and not, as had been suggested, that the alkaloid should be first liberated by an alkali. If that course were adopted, it would be as well to use a solution of atropine at once. He thought an extract of the strength of about .5 per cent. could easily be obtained. He was well aware that many foreign leaves were of very inferior quality, and much was offered for sale which was not belladonna leaf at all, although similar in appearance.

Mr. BIRD expressed the hope that the colour of collodium belladonnæ would not again be changed, since the preparation had now come into fairly general use, and he suggested that future experiments should be conducted with a view to the utilisation of the root.

Mr. GERRARD asked if any one could give any information with regard to the comparative therapeutic value of the plaster and the collodium. In his experience, when the plaster was properly made according to the B.P., it was a very common thing to have it sent back with the complaint that it produced pustular eruptions, dilatation of the pupil, etc. In fact, having to spread a large quantity of belladonna plasters, he had been obliged to reduce the belladonna extract to one half the quantity directed, otherwise the complaint was made that blisters were sent instead of belladonna plasters. The extract as commonly supplied was by no means satisfactory. In the B.P. process water was used for displacement, and the result was that a watery extract got into the alcoholic extract, and he should therefore like to see the process altered. On the question of the extracts obtained by Messrs. Wright and Naylor respectively, did they not obtain two distinct kinds of extract? On allowing them to stand he believed it would be found in each case that there was an upper layer of a lighter colour, and a heavier layer of a brown colour, in the case of the leaf, with a considerable amount of green fatty chlorophyll. The question was, were they able to get both the green and brown extracts in solution? He felt inclined to favour Mr. Linford's idea of liberating the alkaloid with ammonia. It was easily done, and was an admirable method of extracting alkaloids and getting them into solution. He could not see that the question of natural acid was of much importance; malic acid was a weak organic acid, with no greater therapeutic effect than could be obtained by citric or

tartaric acid. Anything which could take the place of the nasty, disagreeable belladonna plaster to which they were accustomed would be an advance.

Mr. Lake said, it being admitted that the activity of the belladonna plaster was dependent on the alkaloid, it appeared to him that it would simplify matters if a solution of the alkaloid were adopted, of a strength to be decided upon after various experiments. It seemed doubtful whether the natural acid was of any real service in the preparation.

Mr. WRIGHT said he considered that a preparation of a drug, whether belladonna or any other, should represent the drug itself; an alkaloid was a definite thing, and you might have a preparation of it, but if you wanted to prepare an extract or a tincture, it should represent the drug in its entirety, with the alkaloids in the same state of combination in which they existed in the drug. Mr. Gerrard and others had alluded to the fact of malic acid being a very weak acid, and to the difficulty of understanding how the combination between atropine and malic acid could affect the properties of the compound to any considerable extent. On such a subject he should not like to pose as an authority, but he thought the evidence was rather in favour of such an influence. It was difficult to say what changes took place when a drug was administered, either internally or externally, and it was rather begging the question to assert that even a weak acid in combination might not affect the action of the alkaloid itself. One or two points in connection with Mr. Naylor's paper he should like a little further information upon. In one place Mr. Naylor referred to using the drug in No. 20 powder, further on in No. 60 powder, and yet further the process of evolution had gone on, until he was bold enough to speak of using the drug in fine powder. In order to extract a drug with strong alcohol, the finer the powder the better, there need be no fear of clogging in the percolation. He quite admitted that in the preparation of a fluid extract from belladonna leaves it was a great advantage to carry the process of exhaustion to the furthest possible limit, and in the process he had described he admitted that that was not done, but one could in that way get a much stronger extract than Mr. Naylor stated. He had no difficulty in getting from English leaves an extract of from .6 to .8 per cent. by direct percolation. Mr. Naylor used ether to dilute the liquid extract, with the result that a deposit was thrown down, carrying with it apparently one-twelfth the total quantity of alkaloid. It appeared as if they had reversed the operations.

He (Mr. Wright) left some alkaloid behind in the drug; Mr. Naylor took it out, but afterwards added ether, which partially removed it. He should not like to say that his collodium belladonnæ would come up to the standard of .47 of alkaloid, but it was very easy to prepare one by his process which should contain from .3 to .4 per cent. Although alcohol was a good solvent of the active principles of belladonna leaves in the state of combination in which they existed in the drug, ether was not, and he had noticed when adding ether to the fluid extract that there was a crystalline deposit, which he had not yet had time to examine, but should not be surprised to find it to contain atropine or hyoscyamine. He saw no advantage in preparing this article from a dry extract prepared from the succus, and it might be difficult to dissolve an extract prepared from the succus in alcohol without having a subsequent deposit of the active principle. At any rate, as this preparation had made its reputation on the strength of specimens prepared from the leaves, the leaf was the right thing to use. The point mentioned by Mr. Gerrard was very important, and he could corroborate his statement. Over and over again, since the alcoholic extract of the root had been introduced into the Pharmacopœia for the preparation of the plaster, he had heard complaints of patients being blistered.

Mr. NAYLOR said he perfectly agreed with Mr. Wright that it was scarcely their business to discuss whether the alkaloid represented the physiological action of belladonna in its entirety, or whether the addition of the natural acid made any difference to its action. The question he put to himself was this, what was demanded? and the answer was, a galenical preparation; and on examination of that preparation the alkaloid was not found present in the free condition. It was simplicity itself, as the President had said, to dissolve a certain amount of alkaloid in collodium, and if a medical man desired to use such a preparation any chemist in the room would be glad to dispense it. In reference to Mr. Wright's observations, he should like to say that the experiments which he had summarized in the paper had been carried on for a long time, and he had made a selection from a large number of notes, choosing those which he thought would best answer the purpose they both had in view, viz., the production of a better formula than the existing one for liquid belladonna plaster. That partly accounted for the circumstances that powder of different strengths had been used. As to the strength of the preparation, he thought Mr. Wright had slightly discounted his

statements, but he would yield to him if by his process he could show as good results as he (Mr. Naylor) had placed on record in this paper. Further, it would be desirable to adopt Mr. Wright's process if it could be shown that the methods hitherto proposed gave a preparation which was really too powerful for medicinal application. He was much obliged to the gentlemen who had taken part in the discussion. The members of the Committee desired so to amend the formula as to give entire satisfaction, and they could only do this by the assistance of members.

A vote of thanks was then accorded Messrs. NAYLOR and WRIGHT for their papers.

The Conference then adjourned for luncheon.

THE ALKALOIDAL TINCTURES OF THE BRITISH PHARMACOPŒIA.—SUGGESTIONS FOR THEIR STANDARDIZATION.

By E. H. FARR AND R. WRIGHT,

Pharmaceutical Chemists.

During the past three years we have been engaged upon a research having the following objects in view:—

1. To ascertain whether the alcoholic strength of the official menstrua for the preparation of tinctures of drugs containing alkaloids are in all cases the most suitable.
2. To devise accurate and reliable methods for the estimation of the alkaloids.
3. To find the average alkaloidal strength of tinctures prepared from genuine drugs.
4. To test the comparative value of several alternative processes for the preparation of the tinctures.

The work done upon the above subjects has already been published; the principal results obtained are summarized in the table below.

The results recorded in the table show that tinctures prepared from carefully selected drugs vary considerably in strength, and it is to be inferred that commercial tinctures would indicate a much greater variation. This disparity in alkaloidal strength must necessarily give rise to a corresponding lack of uniformity in therapeutic effect, constituting a source of disappointment to the prescriber and, in many instances, of danger to the patient.

The question arises as to whether nothing can be done to

produce tinctures of definite strength; and it is a question to which, as practical pharmacists, we may reasonably be expected to furnish a reply. If a demand were made on the part of the medical profession for galenical preparations absolutely uniform in composition, such a demand would undoubtedly be met, on the part of pharmacists, with a "non possumus."

Such a demand has not hitherto been made, and is not likely to be made in the future, for where scientific precision is required, the alkaloids, or solutions containing them, will be employed.

On the other hand, when a physician prescribes a galenical preparation of a powerful drug, it may be supposed that he wishes to administer to his patient all the active principles of the drug in the state of combination in which they exist in the drug itself; while it remains with the pharmacist to see to it that the preparation placed in the hands of the medical man is as nearly constant in strength as the art of pharmacy can make it.

In the case of galenical preparations of many drugs it is manifestly impossible to set up standards of any description, either because their precise active principles are not known—do not possess well-defined chemical and physical characters—or do not lend themselves readily to isolation in a state of purity. With preparations of drugs containing alkaloids the case is different. The therapeutic effect of these drugs is admittedly due to their alkaloidal principles, and any move in the direction of the standardization of their galenical preparations must evidently take the form of the setting up of some standard for one or more of the alkaloids present.

The principle upon which this standardization should be carried out appears to us to be that where any one alkaloid has been shown to be of supreme physiological importance, and is capable of ready isolation and estimation, the proportion of such alkaloid present should decide the question of the standard; but where the activity of the drug is due, not to one alkaloid chiefly or entirely, but to the indefinite mixture of alkaloids, then the strength of the preparation should be regulated according to the percentage of total alkaloids.

The cases in which one alkaloid is of cardinal importance are rare. Probably morphine may be instanced as the principal constituent of opium, although the researches of Dott and Stockman have shown that the action of the other opium alkaloids more closely resemble that of morphine than has been commonly supposed (*Year-Book of Pharmacy*, 1891, pp. 242 to 244).

Table I.

Tincture.	Official Menstruum.	Proposed Menstruum.	Percentage of Alkaloid in Tinctures.	Average Percentage of Alkaloid in Tinctures.	Process Recommended for Tincture.
Aconite . . .	90 p. c.	70 p. c.	·015 to ·036	·062	Percolation.
Belladonna . .	57 p. c.	50 p. c.	·015 to ·045	·028	Macero-percolation or percolation.
Cinchona . . .	57 p. c.	70 p. c.	·76 to 1·50	1·0	Macero-percolation or percolation.
Colehium . . .	57 p. c.	50 p. c.	·064 to ·119	·085	Percolation.
Conium . . .	57 p. c.	70 p. c.	·06 to ·16	·086	Percolation.
Gelsemium . .	57 p. c.	60 p. c.	·030 to ·076	·044	Percolation.
Hyoscyamus . .	57 p. c.	50 p. c.	·008 to ·015	·010	Macero-percolation or percolation.
Jaborandi . . .	57 p. c.	50 p. c.	·016 to ·152	·103	Percolation.
Lobelia . . .	57 p. c.	50 p. c.	·028 to ·044	·038	Percolation.
Opium . . .	57 p. c.	80 p. c.	—	—	Maceration.
¹ Stramonium . .	57 p. c.	50 p. c.	·020 to ·034	·026	Macero-percolation or percolation.
Veratrum viride	90 p. c.	70 p. c.	·032 to ·220	·138	Percolation.

Another case in point is that of the aconite alkaloids, where the masterly work of Professor Dunstan and his co-workers in the Research Laboratory has clearly established the fact that the toxic effect of the plant *Aconitum Napellus* is due to the crystalline alkaloid, aconitine.

But apart from these instances there is nothing to show that the tinctures of other alkaloidal drugs included in the British Pharmacopœia may not reasonably be standardized according to the amount of total alkaloid present.

The question next arises as to how standardization on the above lines is to be carried out.

It might appear at first sight as if all reasonable requirements would be met by the employment of standardized drugs; the responsibility being thrown upon the pharmacist of producing therefrom preparations as uniform in character as possible.

Altogether apart, however, from the difficulty experienced in obtaining drugs of a definite degree of alkaloidal content, it will be seen on reference to our notes on cinchona and opium (*Year-Book of Pharmacy*, 1891, p. 497, and the *Chemist and Druggist*, vol. xlii., p. 78) that the employment of standardized drugs does not ensure uniformity in the strength of the resulting tincture.

¹ Recommended to be prepared from the leaves.

An alternative method consists in the production of a standard extract, and its utilisation for the other galenical preparations of the drug.

This is the official method for tincture of *nux vomica*, and a similar plan has been proposed by Dunstan and Ransom (*Pharm. Journ.*, [3], vol. xvii., p. 843), and also by Barclay (*Pharm. Journ.*, [3], vol. xxiii., p. 740), for the production of preparations of *belladonna*.

There are, however, objections to a process such as this.

In the first place, the preparation of the extract involves the exposure to heat of those constituents of the drug which are most susceptible to change. In the case of *nux vomica*, the extract is so far affected that it is never entirely soluble in alcohol of the same strength as that with which it was originally prepared; while the resulting tincture is not only darker in colour than one of equal strength prepared without heat, but is also apt to throw down an unsightly deposit.

The dictum that a tincture should contain the active principles in the exact condition in which they exist in the drug itself demands that the application of heat in its production be avoided if possible. Another objection to the preparation of tinctures from extracts is that very few extracts remain in the same condition for any length of time. Those containing deliquescent mineral salts will absorb moisture, others become hard and dry; and in the latter case one does not always find it the easiest matter in the world to obey the official injunction to "dissolve the extract in the spirit." Another, and very practical objection, is that the conversion of a tincture into extract, followed by the re-conversion of the extract into tincture, involves a needless waste of time.

Such considerations as these have led us to the conclusion that the most feasible plan for the production of tinctures of constant strength consists in the preparation of a strong tincture by percolation, and its subsequent dilution to the required standard.

By such a plan as this the employment of heat is avoided, the natural combinations of the drug are preserved, and the active principles are distributed through such a volume of liquid as may be relied upon to ensure the stability and permanence of the resulting preparation. Preliminary experiments were next undertaken in order to ascertain how far it would be necessary to carry percolation in order to secure the practical exhaustion of each individual drug.

For this purpose 100 grammes of the drug, in powder of the

requisite degree of fineness, was moistened with menstruum, packed in a conical percolator, more menstruum was then added, and percolation allowed to proceed. The percolate was collected in fractions of 100 c.c., and the amount of alkaloid and extract in each fraction was estimated by the processes described in the series of notes on tinctures already published by us.

The results obtained are shown in Table II.

From the results shown in the table it will be seen that a large proportion of the alkaloid is found in the first fraction of the percolate.

In the case of cinchona the alkaloid present in this fraction amounts to 47 per cent. of the whole; in the leaf tinctures from 60 to 66 per cent., in conium and veratrum about 70 per cent., while the first fraction collected from aconite, colchicum, and nux vomica actually contained 80 per cent. of the alkaloid present in the drug operated upon.

A further inference to be drawn from the results given in the table is that the practical exhaustion of such drugs as aconite, colchicum, and nux vomica may be effected by the employment of drug and menstruum in the proportion of 1 to 3, that of conium and veratrum in the proportion of 1 to 4; and that in no case would it be necessary to carry percolation beyond 15 fluid ounces in order to exhaust the quantity of drug representing a pint of tincture.

The process we have followed in order to produce a standardized tincture has been to take the amount of drug ordered in the Pharmacopœia for a pint of tincture, moisten with menstruum, pack in a conical percolator, add more menstruum, and allow percolation to proceed until 10, 12, or 15 fluid ounces percolate has been collected. The marc is expressed, and the expressed liquid added to the percolate, which is then assayed, and a sufficient volume of menstruum added to dilute the tincture to the required standard.

The volume of percolate to be collected in each case, together with the alkaloidal standards proposed, are shown in Table III.

Note 1. The standard proposed for tincture of conium is equivalent to .2 per cent. conine.

Note 2. The tincture of stramonium is made from the leaves.

The results of experiments on the exhaustion of aconite root are given in Table II., but we are not in a position to make any proposal for the standardization of the tincture. For the pro-

Table II.—Showing Percentage of Alkaloid and Extract yielded by Fractions of Percolate from different Drugs.

Tincture.	Alkaloid.					Extract.				
	Fraction 1.	Fraction 2.	Fraction 3.	Fraction 4.	Fraction 5.	Fraction 1.	Fraction 2.	Fraction 3.	Fraction 4.	Fraction 5.
1. (a) . . .	.340	.105	.023	.004	.002	—	13.22	—	—	—
2. (b) . . .	.470	.145	.026	.004	.002	—	—	6.54	—	.55
Aconite . . .	.490	.060	.016	.006	.004	—	—	—	—	—
(c) . . .	.720	.100	.020	.006	.004	18.16	7.42	1.93	.71	.51
Belladonna . .	.460	.050	.086	.016	.004	7.90	2.16	1.11	.63	.54
(1) . . .	.400	.220	.088	.068	.025	14.26	6.90	3.62	1.98	1.30
(2) . . .	8.12	1.66	.60	.42	.30	18.84	8.86	2.78	1.56	1.02
Cinchona . . .	2.91	1.68	1.04	.56	.34	17.48	9.52	5.40	2.54	1.56
(1) . . .	.580	.175	.034	.012	.004	18.46	1.34	.58	.30	.14
(2) . . .	.505	.080	.005	.004	nil	17.10	7.52	.88	.62	.42
Colchicum . . .	.650	.135	.038	.024	.016	15.76	5.90	1.86	.70	.42
Conium . . .	1.373	.351	.074	.039	—	7.32	8.76	1.32	.31	.61
(1) . . .	.112	.043	.022	.022	.018	7.91	1.18	.34	.23	.26
(2) . . .	.280	.052	.016	.006	.003	13.28	2.08	.38	.20	.16
Gelsemium . .	.064	.024	.010	.004	.001	16.72	8.46	3.54	1.26	.86
(1) . . .	.038	.014	.008	.004	.002	11.80	6.84	3.70	2.14	1.24
Hyoscyamus . .	.320	.140	.006	.002	.001	17.10	7.52	.88	.62	.42
(1) . . .	.400	.205	.066	.016	.011	14.84	6.36	2.46	.32	.50
Jaborandi . . .	.180	.050	.016	.010	.004	11.08	2.94	1.10	.60	.36
(1) . . .	.152	.032	.022	.010	.004	8.70	3.80	1.69	.80	.44
Lobelia . . .	1.825	.386	.044	.020	.014	13.98	2.12	.44	.22	.16
(1) . . .	.850	.173	.050	.019	.006	5.92	1.14	.39	.21	.13
Nux vomica . .	.180	.028	.020	.020	.008	3.50	.70	.44	.34	.32
(1) Seeds . .	.180	.060	.036	.016	.008	9.90	3.74	2.34	1.22	.64
Stramonium . .	.450	.150	.040	.032	.008	4.80	1.26	.50	.48	.40
(2) Leaves . .	.550	.180	.028	.008	.004	12.36	5.18	1.30	.44	.32
Veratrum viride (2)										

Note—1. The figures for the aconite alkaloid represent (1) ether soluble, and (2) total alkaloid.

2. The conium alkaloids were weighed as hydrochlorates.

Table III.

Showing results obtained in preparing standard tinctures.

Tincture.	Volume of percolate collected.	Percentage of Alkaloid in percolate.	Proposed standard per cent.	Percentage of extract in finished tincture.
Belladonna	12 fl. ozs.	·068	·025	1·0
Cinchona	15 fl. ozs.	1·27	1·0	6·28
Colchicum	10 fl. ozs.	·156	·075	2·04
Conium	10 fl. ozs.	·520	·25	1·66
Gelsemium	12 fl. ozs.	·056	·025	1·26
Hyoscyamus	12 fl. ozs.	·012	·010	4·14
Jaborandi	12 fl. ozs.	1·24	1·0	3·78
Lobelia	15 fl. ozs.	·052	·025	1·08
Nux Vomica	12 fl. ozs.	·360	·250	1·24
Stramonium	12 fl. ozs.	·037	·025	1·43
Veratrum Viride . .	15 fl. ozs.	·160	·1	3·40

duction of standardized tincture of opium the following process is proposed :—

Take of—

Moist opium in slices 2 ounces.
 Distilled water 14 fluid ounces.
 Rectified spirit 7 „ „

Rub the opium with the distilled water until it is thoroughly disintegrated, macerate for six hours, add the rectified spirit and macerate for seven days, strain and press, adding the pressings to the strained tincture, and filter. The percentage of morphine is estimated by a modification of the B.P. process for the assay of opium (*Chemist and Druggist*, vol. xlii., p. 77), and a sufficient quantity of a mixture of one measure rectified spirit and two measures water is then added to reduce the amount of morphine in the tincture to ·75 per cent.

The PRESIDENT said all must appreciate the value of this most important paper, and the remark with reference to nux vomica was especially to the point. The tincture made according to the present B.P. process had a peculiar burnt flavour and odour, owing no doubt to the method of drying, instead of percolating direct from the drug.

Mr. GERRARD said he had had some experience of the action of heat on alkaloidal matter. If you took a solution of atropine and boiled it even with alcohol, it lost 50 per cent. of its alkaloidal power in about ten minutes. It seemed to be converted into a new body containing, with the old alkaloid, atropa and atropine.

It was very easily done, though it was perhaps not generally known. Strychnine was not so easy to decompose as atropine, still, the same thing applied, he believed, to all alkaloids, and therefore the use of heat should be avoided as far as possible. He should like to know if the authors had any information as to how long these tinctures would maintain their standard strength, because if they changed materially it would give rise to a great deal of annoyance. If a pharmacist were called upon to produce tinctures of a certain standard, and found that after being on his shelves for twelve months they had lost 10 or 15 per cent. of alkaloid, or even more, and the public analyst came down upon him, it would be very unfortunate.

Mr. CONROY said the work done by the authors of this paper was truly gigantic. He had studied all their papers on this subject with very great interest, and he must add that he had learned a good deal from them. He could endorse what had been said by Mr. Wright about preparations from standardized drugs and extracts, and considered it was a retrograde step. He said, when Messrs. Dunstan and Short brought forward their formula for the preparation of tincture of *nux vomica*, that it was a mistake; you did not get as nice a preparation, and it had an unpleasant burnt odour and taste. The standardized opium of the *Pharmacopœia* was also a retrograde step, and he thought the standard of opium should be raised. He thought the plan usually adopted by makers on a large scale was that mentioned by Mr. Wright; they standardized the tincture and made it up to the correct strength. That was the best way of getting the right strength.

Mr. WRIGHT, in reply, said Mr. Gerrard's suggestion had not been lost sight of. Care had been taken to preserve specimens of each batch of tinctures made, which were put by, and as soon as they had time they hoped to settle the question of permanence. These tinctures had been already kept in stock two or three years, and a further report would be made later on. He was grateful to Mr. Conroy for his remarks, especially considering his great experience in the matter. He would emphasize his remarks on the subject of the inadvisability of producing tincture of *nux vomica* from the extract. This was one of the extracts which became very hard and dry, and it was often reported to him by those entrusted with the operation that they could not get the extract to dissolve in the spirit. It had occurred to him whether this might not be a case similar to that which occurred in making tincture of opium by the B.P. process, and whether if the extract were not

entirely dissolved it was certain that all the alkaloid was dissolved. There would be one advantage in fixing a standard for these tinctures which ought not to be lost sight of; it would to a certain extent clear them from what he conceived to be a danger in the production of pharmaceutical tinctures, that the drug might not always be obtained from the proper source. He remembered a case of tincture of jaborandi which did not contain one-fourth the alkaloid it ought to have done. Immediately afterwards he read a paper by Mr. Holmes on the advantage of fixing the geographical source of many of the drugs in the Pharmacopœia, and he mentioned specially *Pilocarpus selloanus*, the leaves of which he said did not contain nearly as much alkaloid as the official jaborandi. Again, in the case of conium he had met with a specimen in which the quantity of alkaloid was so small that it could scarcely be estimated, though judging by the colour, and other characters, one would have said that it was a splendid sample of hemlock fruit.

A vote of thanks was accorded to the authors for their valuable paper.

The next paper read was a—

NOTE ON THE SPECIFIC GRAVITY OF SANDAL WOOD OIL.

BY MICHAEL CONROY, F.C.S.

The specific gravity of sandal wood oil, as given by the various authorities, differs to a very great extent. For instance, the British Pharmacopœia states that it is "usually about" .96; the United States Pharmacopœia "about" .945; Squire's "Companion," 15th edition, .970 to .980 when distilled in London, and .990 when distilled in India; Pharmacographia, .963. Mr. E. M. Holmes, in a very able and interesting paper, published in the *Pharmaceutical Journal* of March 27, 1886, gives the specific gravity, on the authority of Mr. Ince, as .9713 for English oil, and from .9738 to .9797 for German oil. Mr. Peter MacEwan, in a paper published in the *Pharmaceutical Journal* of Feb. 11, 1888, calls attention to the low specific gravity given in the British Pharmacopœia, and recommends that it be raised to .970-.990. More recently Mr. Cripps states that he considers the Pharmacopœia density too low, and recommends that it be raised to .970. He gives particulars of three samples obtained from English houses of repute. These were .9765, .9759, and .9784.

Whilst fully appreciating the value of these very excellent papers, we cannot overlook the fact that the authors were labouring under the disadvantage of working with samples which they did not make themselves. This note is the result of experiments personally conducted on a manufacturing scale with the object of throwing a fuller light on the subject, and I hope to be able to show that the specific gravity of carefully made sandal wood oil is fairly constant, and, on the other hand, that carelessly made oil, though absolutely pure, may vary to a considerable extent. I also hope to show why the Indian-made oil is of greater density.

A distiller of this oil soon discovers that the density increases as the distillation proceeds, the lighter portion coming over first, and the denser last. This holds good with all essential oils that I have observed. The following two experiments show how the density varies:—

A 6 cwt. charge of very fine Mysore wood was placed in the still and the oil collected in six fairly equal portions as it came over. The specific gravities of the first, third, and sixth were carefully taken at 60° F. These were respectively .9683, .9763, and .9833, and the whole six fractions when mixed .9752.

A similar charge of very fine Mysore root was next placed in the still and treated in the same way. The specific gravities of the fractions were practically the same, and the whole when mixed together gave .9758.

These experiments show how important it is to mix the whole of the oil of each distillation together, and I think they show how discrepancies have arisen as to the correct specific gravity of this oil.

During the past few weeks I have taken the specific gravities of over a dozen other batches of this oil, distilled under my personal supervision. These ranged between .9750 and .9759, the difference being only in the fourth decimal place. The lowest specific gravity I have met with distilled under my own supervision was one of .9720.

In Mr. MacEwan's paper referred to above, reference is made to the oil distilled in India being of much greater density than that distilled in England from the same wood. The sample of Indian oil examined by Mr. MacEwan had a density at 16° C. of .9896. This oil was specially distilled in Mysore for the Museum of the Pharmaceutical Society, Dr. Bidie, of Madras, having got it done at Mr. Holmes' request. There was, therefore, no doubt of its genuineness, and its high density appeared to me to be due to the

manner in which the oil is prepared in India. This process is very fully described in Mr. Holmes' paper on the authority of Dr. Bidie, from which it appears that a charge of 50 lbs. of chipped sandal wood is placed in an earthen still, covered with water which is renewed from time to time, and distillation carried on for ten days and nights, the produce of oil from this quantity of wood being 20 ozs. It having occurred to me that this long exposure of the oil to the action of steam, air, and water was sufficient in itself to account for the higher density of the oil, I put my theory to the test in the following simple way:—One pint of English-made oil of known density was placed in a jar with about five gallons of water and kept at a temperature of about 120° F. for ten days and nights. The oil increased in viscosity, became darker in colour, and the specific gravity increased from .975 to .989. The loss of oil in the experiment was half an ounce, due chiefly to waste.

In England the oil is made in about one-fourth of the time, in much larger operations, with more perfect apparatus, and is carefully collected as it comes over from the still to avoid oxidation. This difference in the mode of manufacture, together with the experiment just referred to, fully explains what has hitherto seemed a mystery, and it explains also why the English-made oil is so much superior to the Indian.

The chief point to be drawn from this note is that the specific gravity given in the British Pharmacopœia is too low in the face of the fact that all likely adulterants are of lower density. In my opinion it should be raised to a minimum specific gravity of .972 at 60° F.

The PRESIDENT said he could not help thinking that possibly the cause of the foreign oil being so inferior to the English was that the latter was obtained from the best chips, whilst the Indian oil was collected not only at a higher temperature but very probably from refuse wood not worth exporting. Probably, also, the Indian oil was adulterated before it came over.

Mr. DRUCE asked if Mr. Conroy took account of the relative proportions of the oils of different specific gravity, and also if he had any information as to their relative value therapeutically; the general result would appear to show that the heavier oils were of less value than the lighter, although it was upon the effects of the heavier oil that the reputation of oil of sandal was gained.

Mr. R. WRIGHT did not think there was any essential oil used in

pharmacy which differed in density to so great an extent as that of sandal wood. He had had it as light almost as oil of lemon, and had some now in stock which was almost as thick as castor oil. He had often wondered what was the reason of this variation in density.

Mr. P. MAC^EWAN said this paper was very interesting, but it was mainly corroborative of previous work, and it was very gratifying to those who, like himself, had advocated the alteration of the official specific gravity to .870, to find that Mr. Conroy, from practical experience, agreed with them. Sandal wood oil was not only one of the most variable materials used in medicine, but one of the most interesting. Its therapeutical value was originally based entirely on the Indian distilled article, but now he believed very little of that was imported. What was used was distilled either in this country, in Germany, or in the United States. He thought any specimen which was as light as oil of lemon must be spurious, but the great difference in density which undoubtedly existed was, he believed, due to the age of the wood and the part of the wood employed. Nice, fresh heart wood would yield an oil which might be anything between .860 and .870, simply because it had not been sufficiently exposed to enable the oil to be oxidized. And so with old wood exposed in chips and small pieces they would expect that it would yield a denser oil. A short time ago he heard from a gentleman who had been investigating the distillation of this oil in Mysore the reason why the Indian oil was so heavy, and it was exactly what Mr. Conroy had indicated.

Mr. CONROY, in reply, said he could not agree with the President that the greater density of the Indian oil was due to its being made from refuse wood, and thought it very unlikely. He had tested many samples of Indian oil, and never met with one which was adulterated. There was not so much coming into the market now, because the English was cheaper. He stated in the note that the oil was separated into six equal portions, the first, third, and sixth being the ones of which the specific gravity was taken; they were not exact measurements, but as nearly so as possible. He thought the viscosity of the oil referred to by Mr. Wright was owing to age and oxidation.

Mr. CONROY was thanked for his paper.

Mr. E. H. FARR read the next paper, entitled a—

NOTE ON THE ALKALOIDAL STRENGTH OF HEMLOCK FRUIT.

By E. H. FARR AND R. WRIGHT.

In bringing forward the subject of the present note we must apologise for the want of originality in our work, but the subject is of such importance that we consider it imperative to call the attention of pharmacists generally to the existing condition of things.

In the B.P., 1867, "The dried ripe fruit of *Conium maculatum*" was official, and was used for making the tincture, but owing to the exhaustive researches of Sir R. Christison, Dr. Manlius Smith, and Dr. Harley, who proved the comparative worthlessness of the ripe fruit and advocated the use of the unripe in its place, the compilers of the present B.P. altered their description to meet the recommendations of the fore-named investigators; consequently the fruit now official is directed to be "Gathered when fully developed, but while still green, and carefully dried."

We had occasion in a note on tincture of conium, published in *Pharm Journ.*, [3], vol. xxi., p. 858, to refer to the great variation in the strength of the fruit found in commerce, and we stated that of eleven samples then examined, only one corresponded to the B.P. description of "*Conii Fructus*," that being of English origin. We append the alkaloidal value of the samples then examined, as calculated from the strength of the tinctures yielded by them.

Table I.—Showing the alkaloidal strength of commercial hemlock-fruit :—

HYDROCHLORATES OF MIXED ALKALOIDS PER CENT.										
1 . . . . .	.	.	.	.	.	.	.	.	.	1.304
2 . . . . .	.	.	.	.	.	.	.	.	.	.600
3 . . . . .	.	.	.	.	.	.	.	.	.	.512
4 . . . . .	.	.	.	.	.	.	.	.	.	.568
5 . . . . .	.	.	.	.	.	.	.	.	.	.882
6 . . . . .	.	.	.	.	.	.	.	.	.	.816
7 . . . . .	.	.	.	.	.	.	.	.	.	.800
8 . . . . .	.	.	.	.	.	.	.	.	.	.096
9 . . . . .	.	.	.	.	.	.	.	.	.	.768
10 . . . . .	.	.	.	.	.	.	.	.	.	.800
11 . . . . .	.	.	.	.	.	.	.	.	.	.800

The sample No. 8 was in fine powder, and afforded a green

tincture, but it had evidently been overheated in drying, and thus spoilt.

At the time we stated our opinion that the poor quality of commercial fruit was due to the fact that it was allowed to ripen before being gathered, and not owing to loss of alkaloid on keeping, as suggested by Harley; but we determined on an investigation to clear up that point, and to determine what should be the strength of B.P. dried fruit. With these ends in view, a quantity of fruit was collected by one of us from wild plants, in August and September, 1892, and in July of the present year, and divided into portions corresponding to the average development of the fruit on each umbel, which would vary considerably, the outer fruit being much larger than the inner. The samples represented the different stages of growth from the fall of the petals to full ripeness, and were collected from time to time as opportunity occurred. The plants from which they were gathered differed considerably in size and height, according to age and situation. We append the results obtained on estimation of the various samples.

Table II.—Showing the alkaloidal strength of hemlock fruit, fresh and dried, in various stages of development :—

• HYDROCHLORATES OF MIXED ALKALOIDS PER CENT.

	1892.		1893.	
	Fresh.	Dried.	Fresh.	Dried.
Immature, $\frac{1}{2}$ to $\frac{1}{4}$ grown	—	—	·896	8·00
" $\frac{1}{2}$ to $\frac{3}{4}$ "	·975	—	—	—
" $\frac{1}{4}$ to $\frac{1}{2}$ "	—	—	1·049	8·32
Nearly mature, $\frac{3}{4}$ to full grown	·985	—	—	—
Mature, $\frac{3}{4}$ to full grown	—	—	1·068	8·36
Mature, a few outer ones beginning to turn slightly yellow	—	—	1·049	—
Mature, yellowish green to yellow	·475	—	—	—
Mature, yellow	·484	1·44	—	—
Ripe, grey	—	1·82	—	—

The amount of moisture in the fresh fruit varies from about 60 per cent. in the older stages to about 68 per cent. in the younger, but is not a constant proportion.

It will be noticed that the present season's fruit is of better quality than that of 1892; in fact, it may be looked upon as containing the maximum amount of alkaloid likely to occur.

Another point worthy of attention is the rapid falling away in alkaloidal value which occurs as the fruit begins to ripen, and which, no doubt, is the chief cause of the poor quality of the commercial drug, though we have not been able to collect any sample approaching the poor quality of the average imported fruit.

Our next experiments were conducted with a view to ascertain whether the fruit loses any alkaloid when carefully dried. Harley, in his formula for tincture of the immature fruit of hemlock, recommends 5 ounces of dried or 8 ounces of undried immature fruit to be made into a pint of tincture; therefore, if 5 ounces of the dried are only equivalent to 8 ounces of the fresh fruit, it must be inferred that about half the alkaloid is lost on drying, because the fresh fruit contains about 65 per cent. of moisture. Our own examinations of dried fruit, however, pointed to a different conclusion, therefore, to settle the point, portions of fruit in three separate stages of development were taken and divided, each into two parts as nearly alike as their condition allowed, though being attached to their stalks strict accuracy was not attainable. One portion was well bruised, and sufficient spirit and water respectively added to make a tincture containing 70 per cent. of alcohol by volume, allowance being made for the moisture in the fruit; the other portion was dried at 100° F., powdered, and converted into tincture by percolation with 70 per cent. spirit.

The results obtained on examination of the tinctures corresponded very nearly, and indicated the following proportion of alkaloid in the fresh and dried fruit respectively, weighed as hydrochlorate.

	Fresh fruit.	Dry fruit.	Calculated for dry fruit.
Immature fruit	·896	3·00	2·8
Nearly mature	1·049	3·32	3·28
B.P. fruit	1·088	3·36	3·40

These figures prove that no appreciable loss of alkaloid occurs in drying hemlock fruit at 100° F.

There is a marked difference in appearance between tinctures made from the fresh and from dried fruit; that from the fresh remains bright and free from sediment, whilst that from the dried very soon goes turbid and forms a deposit.

With reference to the keeping properties of the dried fruit, we have not much evidence to offer, but the following will be of interest as bearing on the point. The remains of the sample of

fruit used in the preparation of No. 1 tincture, described in our paper on "Tincture of Conium," previously referred to, were set aside in an open box, merely wrapped in paper as received from the wholesale house. On recently looking up the sample, the fruit was found to be mouldy and worm-eaten. After separation of the larvæ and debris the other portion was estimated, and the results proved that no loss could have occurred, as the yield of alkaloid was greater than in 1890, to an extent proportionate to the loss of substance owing to the depredations of the grubs, which had evidently avoided the alkaloidal portion of the fruit.

After the foregoing evidence afforded by the examination of authentic specimens, we consider that hemlock fruit, if collected in the proper stage of development and carefully dried, should yield about 2 per cent. of alkaloidal hydrochlorates, and that the tincture should be standardized to contain '2 per cent. of conine or '25 per cent. of hydrochlorate. The dose for a tincture of this strength would be the same as that given for the official tincture.

The PRESIDENT said this was another paper of great practical value. Being a volatile alkaloid, of course conium was one of those tinctures which were most open to suspicion, and the fruit as it was received from the herb collectors was generally over-ripe.

Mr. RANSOM asked if the authors had examined any foreign samples of conium fruit.

Mr. ELBORNE asked if any difficulty had been found in obtaining the requisite quantity of wild specimens; if so, he could mention a plantation about ten miles from Nottingham where it grew plentifully.

Mr. FARR, in reply, said the real object of the paper was to point out that as soon as the fruit began to turn yellow, it immediately lost in strength. It should therefore be collected in the stage of those now shown. This would cause no difficulty, because at that stage the bulk of the fruit would be of full size, and possibly a fourth of them not fully developed. Of the eleven samples referred to in the first table, of which only one reached 1 per cent., the sample which was above that was English, all the rest were foreign. They had no difficulty in getting as much of the wild fruit as they required.

A vote of thanks was accorded the authors for their paper.

The Conference then adjourned to the next day.

Wednesday, August 16th.

The PRESIDENT took the chair at ten o'clock, and the business commenced with the reading of a paper by Mr. Ernest J. Parry on:—

COMMERCIAL BEESWAX,

By ERNEST J. PARRY, B.Sc., AND P. A. ESTCOURT, A.I.C.

A large dealer having recently drawn our attention to the amount of adulterated beeswax at present on the market, we obtained samples from sources of various descriptions with a view to seeing if the adulteration was as general as we were led to believe. We obtained twelve samples in all, some of them from the best London wholesale druggists. Of these eight were adulterated and four genuine. It is worthy of note that the samples obtained from the best houses were the most heavily adulterated. Indeed, one of these might better have been described as "adulterated paraffin," consisting, as it did, of about 75 per cent of paraffin and 25 per cent. of beeswax. The usual adulterations of this substance are colophony, paraffin, stearic acid, carnauba wax, and spermaceti, in addition to bodies such as gypsum, ochre and sulphur. Of these we have been able to find only paraffin, stearic acid, and resin (in the samples above referred to).

The general method of analysis used was that of Hübl, by determining the amount of potash required for neutralisation of the uncombined acids, and also that required for saponification of the ethers. The melting-point and specific gravity were taken, the latter by Chattaway's method, and special tests were applied in cases where adulteration was probable. Resin was detected by the nitric acid test in one case only. Five grammes of the sample were boiled with 20 c.c. of nitric acid, and after cooling diluted with water and shaken with ammonia; the presence of resin was indicated by an intense red coloration. Paraffin was indicated in many of the samples by the low amount of alkali required for both neutralisation and saponification. Its isolation was effected by decomposing the beeswax by boiling it with strong sulphuric acid. The fluid frothed and evolved sulphurous acid, and much charring took place. The mass soon became solid, and was washed with water and exhausted with ether in a Soxhlet's apparatus. The charring was repeated twice, sometimes three times. The paraffin hydrocarbons were thus separated in a nearly pure state. The melting point of these were taken and found to be in nearly all cases about 4°-6° below that of the sample from which they

were extracted; for example, in samples Nos. 5 and 6 the paraffin melted at 54°.

Below is a table embodying the results of the analyses. We may point out that the accepted figures for genuine wax are as follows:—

	Sp. gr. at 15°5.	Sp. gr. at 100°.	Melting point.	P. c. of KOH for acids.	P. c. of KOH for ethers.
Unbleached wax	·9630	·8220	68°·5	2·0	7·5
Bleached (air)	·9610	·8180	68°·5	2·0	7·5
„ (chemically)	·9640	·8270	68°·5	2·4	7·1

Although paraffin and resin were the only adulterants we were able to actually detect, in those cases where we extracted the hydrocarbon wax, and the percentage of potash used for neutralisation of the free acids was greater than the amount of beeswax present required, we could only assume that this was accounted for by the presence of stearic acid. For example, in sample No. 5 the percentage of myricin found was 25. Taking 85 per cent. as an average pure wax, this represents 30 per cent. of beeswax, which would require about ·6 per cent. of potash for neutralisation of the free acids. The sample, however, required practically 2·2 per cent., that is 1·6 per cent. in excess, which represents 8 per cent. of stearic acid. The only reason we have for offering this note to the Conference is to point out to what an alarming extent even the best druggists are supplying adulterated wax, and we think the Pharmacopœia might well give some fuller and more decisive tests than it at present does for this article. (For Table of Analysis, see p. 372.)

The PRESIDENT said every one would agree that this paper contained a serious indictment, and demanded the most careful consideration. He had no idea that beeswax was adulterated to anything like such an extent. Living in a country district, he had no difficulty in obtaining from those who kept bees sufficient wax for his requirements, but that did not apply to large towns, and especially to London, where the chemist had to depend upon the wholesale houses. Who was responsible for this adulteration was a very serious question. He had always supposed that the wax supplied in half basin-shaped blocks was pure, though sometimes of indifferent colour.

Mr. NAYLOR said it should be remembered that beeswax was used for other purposes as well as pharmacy. There was a mix-

Table of Analyses.

No.	Description.	Melting Point.	Specific Gravity at 15°.	Specific Gravity at 99°.	Percentage of KOH for acids.	Percentage of KOH for ethers.	Total percentage of KOH.	Calculated for Cerotic Acid.	Calculated for Myristin.	Approximate percentage of beeswax.	Adulterants.
1.	Pure unbleached beeswax.	72°	·9800	—	8·98	4·0	12·98	65·7	48·8	56	Resin.
2.	Pure bleached beeswax.	64°	·9620	—	2·3	7·48	9·76	16·8	89·6	100	—
3.	Pure bleached beeswax.	60°	·9560	—	2·7	6·0	8·7	19·9	72·4	84	Paraffin and stearic acid.
4.	Pure unbleached beeswax.	64°	·9620	·8190	1·96	7·29	9·36	14·4	88·0	100	—
5.	Pure unbleached beeswax.	57°	·9240	·7920	2·18	2·07	4·25	15·9	25·2	30	Paraffin and stearic acid.
6.	Pure unbleached beeswax.	57°	·9180	·7857	1·53	4·70	6·23	11·2	56·7	66	Paraffin and stearic acid.
7.	Pure unbleached beeswax.	64°	·9620	·8185	1·96	7·0	9·07	14·4	84·5	100	—
8.	Pure bleached beeswax.	62·5°	·9680	·8180	2·4	7·1	9·50	17·5	85·7	100	—
9.	Pure bleached beeswax.	59°	·9660	—	1·25	6·6	7·85	9·2	79·7	—	Paraffin.
10.	Pure bleached beeswax.	51·5°	·9393	—	0·61	2·46	3·07	4·5	29·7	35	Paraffin.
11.	Pure unbleached beeswax.	59°	·9451	—	2·37	6·22	8·59	17·4	75·0	88	Paraffin and stearic acid.
12.	Pure unbleached beeswax.	61·5°	·9346	—	1·29	3·06	4·35	9·4	87·0	44	Paraffin and stearic acid.

ture, such as Mr. Parry had referred to, of solid paraffin and beeswax, and it was not at all uncommon for wholesale houses to be asked for the mixture under a particular name, for certain purposes which had nothing to do with galenicals. He was surprised to hear that beeswax was adulterated with stearic acid, and he should like to know if there were any other circumstantial evidence, apart from the analytical data given, to confirm that statement. He would also ask Mr. Parry if he had made blank experiments, adding so much paraffin, or stearic acid, to pure beeswax, and comparing the results with his previous ones. He believed that the beeswax in the English market was principally drawn from the country districts, and it was a common thing for wholesale houses to be dependent almost exclusively on their customers to supply them. He was much surprised at the results brought forward, and though he did not in the least question the correctness of the analyses, he thought the facts were to be accounted for in some other way than by wilful adulteration.

Mr. J. LAIDLAW EWING deprecated the employment of such strong language as appeared in the paper, which when published would lead people to believe that the best chemists were in the habit of supplying adulterated beeswax. As far as he knew nothing of the kind prevailed in Scotland, where they had an abundant supply of genuine beeswax.

Mr. LINFORD said there was one very obvious source for the so-called adulteration by paraffin. It was a very common practice now with bee-keepers to put into their hives comb foundations for the bees to build on, and these were frequently made of paraffin wax. Of course, when the bee-keeper had extracted the honey he melted down the comb, paraffin foundation and all, without any intention to adulterate, and the wax thus obtained might easily show 10 per cent. of paraffin.

Mr. GRIERSON thought the author had done a great service to the wholesale as well as the retail trade. It was high time that attention was called to the matter, for it was well known in the wholesale trade that so-called genuine wax was sold at a lower price than it could be got for. It was offered regularly at 1s. 2d. a lb., whereas the genuine article could not be bought in large quantities for less than 1s. 4½d. or 1s. 5½d. The wholesale trade was not entirely to blame; the retail trade had the matter pretty much in their own hands, for it was perfectly possible to get pure wax if they insisted on it. It was not at all necessary that the wax should be English. Some of that imported from Holstein

and also from Jamaica appeared to him to be thoroughly genuine, and quite equal as regarded its physical properties to the English article. Perhaps one reason of the present state of things was the difficulty of testing it, and if the method now suggested were a ready one, and the subject were taken up generally, much good might be done.

Mr. BURDEN said he could confirm what the President had said about the difficulty of getting pure wax in London. In the old pharmacopœia it was a very important article, and preparations made with different sorts of wax varied very considerably. The difficulties he had experienced in getting really fine genuine beeswax were so great that for many years he had obtained it from the bailiff on a nobleman's estate in Essex, and honey also; and it was quite different to what he could get from any wholesale house in London. Many preparations depended to a great extent for their efficacy as well as keeping properties on the purity and character of the beeswax, and the matter was therefore of very considerable importance.

Mr. CONROY said no doubt there was a lot of adulteration in beeswax, but the wholesale houses were not to blame. He believed Mr. Parry alluded chiefly to white wax.

Mr. PARRY said no; he tested seven yellow samples and five white, and of the adulterated ones five were yellow and three white.

Mr. CONROY said he was surprised at that. There was no doubt a great deal of adulterated beeswax on the market, but for pharmaceutical use there was plenty of pure wax to be had from almost any London or provincial house. In Liverpool there was an enormous amount imported from North America and Chili, and he very rarely found it adulterated. He had never found gypsum, ochre, starch, or resin in beeswax; those adulterants were found in text-books, but not in commerce. Nor had he ever found stearic acid. The usual adulterant for white wax was spermaceti, which was added to whiten it, and for yellow wax, ceresin.

Mr. DRUCE thought Mr. Parry had done good service in bringing this matter forward. If a person asked for beeswax he ought to get it; if he wanted ceresin he could order it.

Mr. BURFORD said some gentlemen seemed to think that the wax obtained in the country was quite unsophisticated, but he had met with it containing a large amount of yellow soap.

Mr. BUTLER said much of the foreign wax imported was quite equal to anything obtained from the rural districts of England; it

was quite as free from adulteration, and answered equally well. This could be obtained and sold at 1s. and 1s. 2d. a lb., or even less.

Mr. CONROY said a very common adulterant of foreign wax was in the shape of stones weighing from 7 to 14 lbs.

Mr. PARRY, in reply, said he knew that some time ago people in the country had a much better chance of getting pure beeswax than those in London; but he believed a good deal of that now sold by London houses was imported. It was acknowledged on all hands that there was a mixture of paraffin and beeswax on the market, which was not used for pharmaceutical purposes, but his point was that it was used for such purposes. It was almost an open secret that the white flat saucer wax was invariably adulterated, because it was regularly melted down with paraffin before it was supplied; but he was careful to obtain every sample except one—which was no doubt the worst—as pure genuine beeswax in the lump form, which had not been cast in a saucer. He had the sample still, and if he could find it he would send it to Mr. Naylor. There was no question of blank experiments; if you boiled beeswax three times with concentrated oil of vitriol under a condenser, and extracted with ether, there was no question of beeswax; hydrocarbon wax was the only thing which would stand that treatment. He did not think stearic acid was a mere text-book adulterant; Mr. Allen made a strong point of it in his "Commercial Analysis;" nor were some of the other adulterants, sulphur for instance. The practical inconvenience resulting from this adulteration was very great. After he had written this note he was brought a large number of stock articles which his firm sent out in which beeswax was an ingredient, and the wax had been so soft owing to the presence of paraffin that the whole of them melted during the warm weather. They could not get pure beeswax, and were obliged to use carnauba wax to get the required consistence. He had no desire that these things should be published in the newspapers, but he thought it very desirable that the pharmaceutical press should deal with the matter. He noticed that most of the gentlemen who agreed with him had examined a large number of samples, but those who differed from him seemed to go by their general impressions. As to the tests, the specific gravity was a very simple one; the Pharmacopœia limits were far too wide, '950 to '970. He should not allow more than from '960 to '965, with perhaps a margin of one on each side. When you had beeswax melting at 51° there could be no question about it. He did not think it necessary to make blank experiments, because the analy-

tical figures were so well understood. The specific gravity and melting point were practically fixed; the amount of potash should not vary more than from 9 to 10 per cent., but he had a sample going down as low as 4 per cent. of potash for complete saponification and neutralisation. On the whole he thought he had treated the subject very mildly.

Mr. NAYLOR said it was not the question of detecting paraffin in beeswax which required check experiments, but to ascertain whether the results were quantitatively correct as well as qualitatively.

Mr. PARRY said the quantity was determined by the amount of potash, but in many cases they actually weighed the paraffin, and as a rule it corresponded within 5 per cent. Of course the method was a little crude, but as a rule the paraffin obtained by weight agreed with that obtained by saponification.

Mr. PARRY was thanked for his interesting communication.

The following paper was then read:—

NOTE ON EASTON'S SYRUP.

By R. WRIGHT,

Pharmaceutical Chemist.

The original formula for this syrup, as published by Dr. Aitken in his "Science and Practice of Medicine," included (1) the preparation of ferrous phosphate by precipitating a solution of ferrous sulphate with an excess of sodium phosphate, (2) the preparation of quinine hydrate by treating an acid solution of the sulphate with a slight excess of ammonia, and (3) the solution of the well-washed precipitates, together with a fixed quantity of strychnine, in dilute phosphoric acid; the process being completed by the addition of sugar, which was dissolved in the solution without the employment of heat.

As originally devised, the syrup was intended to contain the equivalent of 1 grain quinine sulphate, $\frac{1}{3}$ grain strychnine (alkaloid), and 1 grain hydrous ferrous phosphate in each fluid drachm.

The process published by Dr. Aitken was faulty in more than one respect, and although, judging from the quantities given in the formula, the evident intention was to produce 24 fluid ounces of syrup, the wording of the recipe was so vague and indefinite,

that in the hands of different operators it might yield, as shown by P. W. Squire (*Chemist and Druggist*, vol. xlii., 795), 25, 29, or 31 fluid ounces.

Taking into account the indefiniteness of the original recipe and the susceptibility of the ingredients to undergo physical and chemical changes, it is not to be wondered that the pharmaceutical mind has been greatly exercised over this compound, with the consequent result that numerous suggestions for its improvement have been made.

The following is a list—necessarily incomplete—of writers on the subject:—

T. B. Groves, *Year-Book of Pharmacy*, 1869, p. 35.

W. L. Howie, *Year-Book of Pharmacy*, 1876, p. 588.

E. B. Shuttleworth, *Year-Book of Pharmacy*, 1877, p. 244.

T. M. Clague, *Year-Book of Pharmacy*, 1889, p. 380.

W. Lyon and W. Martindale, *Pharm. Journ.*, [3], vol. xxiii., p. 795.

P. W. Squire, *Chemist and Druggist*, vol. xlii., pp. 422 and 795.

An analysis of the literature of the subject shows that the attention of pharmacists has been directed mainly to the following points:—

1. The process best adapted for the introduction into the preparation of a definite quantity of ferrous phosphate.

2. The composition of the deposits (crystalline and amorphous) which appear in the syrup.

3. The cause, and prevention, of the development of colour in the syrup, on keeping.

4. The excessive acidity of this and other phosphatic syrups.

Several methods have been employed for the preparation of the ferrous phosphate. By Easton's original process at least 30 per cent. was lost, and in the B.P. 1867, sodium acetate was introduced, by which means the loss was reduced to about 20 per cent. Schweitzer proposed the substitution of sodium bicarbonate for sodium acetate, in order to neutralise the free acid, and this suggestion was adopted in the last edition of the British Pharmacopœia. By this means practically the whole of the phosphate theoretically producible is obtained.

It was, however, shown by Howie and others, that in the phosphate thus prepared the proportion of ferrous phosphate was not greater than 50 per cent. H. W. Jones (*Pharm. Journ.*, [3], v., 541) was the first to suggest the production of the phosphate in

solution by the direct action of phosphoric acid upon the metal, and this process is now very generally followed.

The deposit which occurs in the syrup varies in its character. As thrown down by old specimens it usually consists of ferric phosphate in an amorphous condition. Sometimes, however, as shown by Clague in a note read before this Conference in 1889, a distinct crystallisation takes place, accompanied frequently in cold weather by gelatinisation of the syrup and subsequent solidification.

The crystals formed consist of an acid phosphate of quinine.

The development of colour in phosphatic syrups was shown by Groves some years ago to be due to the production of caramel by the action of free phosphoric acid upon the sugar.

This conclusion is supported by the fact that the amount of discoloration in the syrup appears to vary according to the percentage of acid and of sugar present.

The development of colour is also accompanied by partial oxidation of the iron, and is proportionate to the amount of iron converted into ferric salt, the whole series of changes being induced through the agency of atmospheric oxygen.

Not only is the discoloration of phosphatic syrups attributable to the action of the free acid upon the sugar, but the crystallisation of the quinine salt has been referred by Dott, Lyon, and Squire to the same cause.

It is somewhat remarkable therefore that, when in the last edition of the British Pharmacopœia, the proportion of free acid in the official syrup of phosphate of iron was raised by 50 per cent., the fact would have escaped criticism, but that attention was drawn to it by Conroy, in a note read before the Liverpool Chemists' Association (*Pharm. Journ.*, [3], xvi., 379).

I believe that most, if not all, the ills of which we have to complain with regard to Easton's syrup, and also to syrup of phosphate of iron, are due to their extreme acidity.

Now it has been shown that the latter preparation may easily be made with only half the B.P. quantity of phosphoric acid, and that a syrup so made is stable and satisfactory.

Lyon has also proved that a preparation of this character is well adapted for the production of Easton's syrup, yielding a product which will keep for a reasonable length of time without depositing, crystallising, or undergoing discoloration.

A careful review of the whole subject has led me to the following conclusions :—

1. That the ferrous phosphate is best prepared by the direct action of phosphoric acid upon metallic iron.
2. That the employment of the official *syrupus ferri phosphatis* in the process for making this syrup should be discontinued.
3. That the quantity of sugar should be reduced by about 10 per cent., as suggested by Martindale and Clague.

The subjoined formula is drawn up in accordance with the above conclusions, and is submitted to the consideration of this Conference, and especially of the members of the Formulary Committee, in the hope that it may be found more satisfactory than existing formulæ :—

Take of :—

Iron wire, free from oxide	75 grains
Concentrated phosphoric acid	
sp. gr. 1.5	11 fl. drachms.
Strychnine in powder	5 grains.
Phosphate of quinine	120 grains.
Simple syrup	13 fl. ounces.
Distilled water, a sufficient quantity.	

Place the iron wire, and the phosphoric acid previously diluted with an equal volume of distilled water, in a small flask, plug the neck with cotton-wool, and heat gently until the reaction is complete; then add the strychnine and the phosphate of quinine, and shake till dissolved; filter the solution into the cold syrup, wash the filter, and add as much more distilled water as may be required to make the volume of syrup up to one pint.

The above preparation will contain 1 grain phosphate of iron, $\frac{3}{4}$ grain phosphate of quinine, $\frac{1}{2}$ grain strychnine in each fluid drachm.

Mr. STROTHER asked if the author had tried putting samples in the sun to bleach, which he believed was recommended by some.

Mr. WRIGHT said he thought that would be the best way to develop colour.

The PRESIDENT said he found Easton's syrup a very simple thing to make, but a very difficult one to keep. If this were owing to excess of acid, which caused grape sugar to be formed instead of cane sugar, the remedy would be simple, and he thought the discoloration was largely due to the same cause. Where only small quantities were required it would be better if liquor strychninæ could be substituted for powder, as there would be less chance of too much of that powerful agent being present.

Mr. J. RUTHERFORD HILL asked how Mr. Wright's formula differed from that given by Mr. Lyon. As far as he could gather there was very little difference, and Mr. Lyon was in consultation with him during the progress of his work, so that he had an opportunity of seeing what was being done. The syrup he produced was very much like the sample now handed round; it kept perfectly under the most severe tests that such preparations could be subjected to. The chief point dealt with by Mr. Lyon was the question of the separation of crystals. He understood Mr. Wright to state that these crystals were acid phosphate of quinine, but was not quite sure whether that statement was based on experimental evidence. Mr. Lyon attempted to ascertain what these crystals consisted of, but no method he could devise was free from the very serious objection of possibly causing decomposition of the crystals in attempting to separate them in a state of sufficient purity to justify a statement that they consisted of acid phosphate of quinine. He thought it was proved by Mr. Lyon that the separation of these crystals was due to an excess of phosphoric acid, that it could be avoided by reducing the percentage of acid, that no other change was necessary, and that a perfectly stable and satisfactory syrup was produced. Possibly a reduction in the quantity of sugar might facilitate the development of colour. He gathered that this coloration was ascribed to exposure to sunlight, or that that had a powerful effect upon it, but he was not quite sure of that. Some years ago he purchased some Easton's syrup which was offered for sale in a grocery establishment; the density was rather low, and it evidently did not contain a high percentage of sugar; it seemed all right to look at, except that there was a slight separation of crystals. It had now been in his possession about four or five years, and had been kept in a place where sunlight was absolutely excluded, but it now looked very much like tar, being quite black. Altogether it was a very remarkable specimen, which he should be glad to submit to anyone who felt inclined to investigate this question of coloration. He did not think Mr. Wright had advanced the question much beyond the point at which Mr. Lyon left it, and he might add that subsequent experience had shown Mr. Lyon's formula to be very satisfactory, to yield a stable syrup, and to meet every reasonable requirement.

Mr. BIRD thought the coloration might be partly due to the action of the phosphoric acid on the sugar, producing a caramel; but there was another cause also, viz., the well known reaction between the quinine salt and the iron, which Mr. Martindale

referred to in a previous edition of his "Extra Pharmacopœia." A solution of phosphate of quinine and phosphate of strychnine could be kept in a bottle almost any length of time without changing colour, and so would a solution of ferrous phosphate if kept securely corked; but if the two were mixed a distinct coloration immediately took place, which went on increasing almost indefinitely. He had never seen this reaction satisfactorily explained, and did not know its exact nature, but it suggested the idea that the best way to secure a colourless syrup would be to keep the iron solution separate until it was wanted for use.

Mr. GRIERSON said anyone who had made Easton's syrup knew that from time to time when the quinine salt was dissolved in a solution of ferrous phosphate colorisation took place almost immediately. On the other hand, the latter solution, without the addition of quinine or even sugar, if exposed to the air would become brown, so that there must be a number of conditions which tended to turn ferrous phosphate dark. He considered there were three actions at work. First, the oxidation of the solution of ferrous phosphate; next, some kind of reaction between that and the quinine; and, thirdly, he had little doubt that when the syrup was kept some time there was also the production of caramel. He did not think it would ever be possible to make an Easton's syrup which would keep indefinitely, even when secured from the access of air. With regard to Mr. Wright's formula, he was inclined to think the syrup was too thin, and he did not consider that keeping it a month in a closed bottle was a sufficient test.

Mr. WRIGHT, in reply, said he held that he was the first to point out in 1888, that the syr. ferri. phos. of the B.P. could be made with half the official quantity of phosphoric acid, and he also took great pains then to prove that such syrup could be kept for a long time without undergoing undue discoloration. He had now in his possession samples of syrups made to confirm the statements in the "note" referred to, and on looking over them the other day he was strongly tempted to bring them with him, because in the specimen made with the smallest possible quantity of phosphoric acid the discoloration had proceeded to only a very slight extent. He also showed in that paper that the amount of discoloration was proportionate to the quantity of free acid contained in the syrup, and that it was due directly to that free acid. Mr. Lyon had made use of his note as the starting point of his experiments, and went on to show that his syr. ferr. phos. could be conveniently employed for making Easton's syrup, and that when so made it

would keep for a considerable length of time. Mr. Lyon's formula was that of the Conference Formulary, the only difference being that he used the syr. ferri. phos. made from his (Mr. Wright's) formula in making the syrup. He did not claim any originality for this paper; he simply submitted the revised formula to Mr. Naylor, as Secretary of the Formulary Committee, who suggested that he should write a note upon it, and he thought it a good opportunity to give a *résumé* of the literature of the subject up to the present time. The difference between his formula and that of Mr. Lyon was this: Mr. Lyon made his solution of phosphate of iron, then made a separate solution as ordered in the Conference Formulary of the strychnine and quinine phosphate in phosphoric acid, and mixed those two solutions with the proper quantity of syrup. It struck him that the whole process might be done at once, and that there was no need for making so many different solutions. He made a solution of phosphate of iron, added the phosphate of quinine and the strychnine, and shook up, and found they dissolved readily; the solution was then simply filtered into the syrup, and water added to make up the required quantity. There was that slight difference, but he did not wish in the least to depreciate Mr. Lyon's work. He had not proved by experiment that the crystals thrown down consisted of acid phosphate of quinine; he believed that Mr. Lyon stated such to be the case, but thought he could not have said what acid phosphate it was. If the statement in his paper were erroneous he should be happy to correct it, but the literature of the subject had been carefully looked up. He believed that Mr. Dott had made a similar statement both at the last meeting of the Conference and at a meeting of the North British Branch, and Mr. Squire had come to the same conclusion. He did not quite understand whether Mr. Hill meant to state positively that no reduction in the quantity of sugar was necessary, or only to suggest it, but Mr. Martindale had suggested a 10 per cent. reduction, and Mr. Clague had proved that the gelatinisation and solidification of the syrup were due to the excessive amount of sugar, and had shown at any rate that it took place far more readily when the quantity was increased. He had no doubt the syrup he had shown would keep for twelve months easily, and he had great confidence in recommending this formula, which he was willing to call "Lyon's formula, slightly modified."

The President proposed a vote of thanks to Mr. Wright for his paper, which was carried unanimously.

The next paper read was entitled—

NOTES ON EFFERVESCENT CAFFEINE PREPARATIONS.

By LEWIS OUGH, F.C.S.,

Pharmaceutical Chemist.

Having occasion some time ago to examine numerous samples of commercial effervescing preparations, a difference in taste was frequently noticed in samples stated to be of similar strengths, and this difference was confirmed on determination of the active ingredient, which was frequently found to be below the amount stated. Being unable to find any note or paper dealing with this subject, it was thought that the publication of the results of an analysis of a series of commercial specimens would be of interest, and although I had hoped to have tabulated results of others besides caffeine preparations, circumstances have not permitted, consequently these must be left for some future occasion.

The specimens examined have been the citrate and hydrobromate, which in most cases have been taken from the original bottles of well-known makers, the strength being on the labels.

The examination in each case has been conducted as follows:—A weighed quantity of the preparation has been carefully dissolved in water, slight excess of dilute ammonia added, and the solution shaken up with four successive quantities of chloroform which has been separated and evaporated to dryness in a tared dish on a water-bath and weighed, this in each instance being identified as caffeine by the murexid test. It is almost unnecessary to mention that these preparations are usually labelled as containing so many grains of active ingredient in each drachm (or teaspoonful).

Table I.—Effervescent Citrate of Caffeine.

No.	Stated strength.	Actual strength.
1	1 in 60	1·96 in 60
2	1 in 60	1·35 in 60
3	1 in 60	2·69 in 60
4	2 in 60	1·64 in 60
5	2 in 60	1·90 in 60
6	2 in 60	1·21 in 60
7	3 in 60	2·97 in 60
8	3 in 60	3·10 in 60
9	5 in 60	3·45 in 60
10	5 in 60	5·31 in 60

Table II.—*Effervescent Hydrobromate of Caffeine.*

No.	Stated strength.	Actual strength.
1 . . .	1 in 60	·64 in 60
2 . . .	1 in 60	1·20 in 60
3 . . .	1 in 60	2·32 in 60
4 . . .	1 in 60	·91 in 60
5 . . .	2 in 60	1·96 in 60
6 . . .	2 in 60	1·30 in 60
7 . . .	2 in 60	1·98 in 60
8 . . .	3 in 60	1·96 in 60
9 . . .	3 in 60	1·57 in 60
10 . . .	3 in 60	2·13 in 60

In calculating these results, the official formula for the alkaloid and the citrate has been taken, and the hydrobromate as $C_8H_{10}N_4O_2 \cdot HBr \cdot 2H_2O$, as given in the *Year-Book*, 1891, page 40.

In reviewing the above results it will be seen that in Table I. only three samples (Nos. 5, 7, 8), and in Table II. a similar number (Nos. 4, 5, 7), may be looked upon as being correct in containing the amount of caffeine salt as stated.

Nos. 3 in each table were manufactured by the same firm, and one is quite at a loss to understand why the alkaloid is so much above the stated strength. But even the taste of these compared with a test sample made to contain one grain of the alkaloid salt in each drachm was very much more distinct and bitter. The other results are rather more favourable, but surely with a little more care in their manufacture these preparations may be easily made to contain the exact amount of active ingredient in the finished product, and it is hoped that, attention having been called to the matter, this state of things will in future be rectified.

As apparently the use and sale of these important preparations are steadily increasing, and as, in all probability, their adoption will in time become more general, it is important that members of the medical profession especially may depend upon the article being absolutely reliable and of the strength stated, and seeing that the preparations usually met with in commerce vary considerably, it appears to be time that a definite standard of strength should be fixed, and I would suggest that certainly not more than two in each instance should be adopted, viz., the citrate, 3 and 5 grains in each drachm, and the hydrobromate, 1 and 3 grains in each drachm.

In conclusion, I beg to call attention to a sample of effervescent citrate of caffeine sweetened with saccharin instead of sugar,

which appears, in many instances, to have distinct advantages over the ordinary kind.

Mr. CONROY said it was very astonishing that there should be such carelessness shown in such a simple preparation. Any one in the habit of making these things could tell very nearly what they would obtain from a certain quantity of ingredients, and it was easy to add the right amount of caffeine, either hydrobromate or citrate. He did not mean to express any doubt as to the accuracy of the statements, as he thought the method employed admitted of no mistake.

Mr. C. SYMES (Liverpool) also thought it very extraordinary that there should be such great differences in a preparation in which there was no difficulty in getting comparatively accurate results. If he understood it rightly, one specimen which was labelled 1 grain to a drachm contained 2 grains, and those labelled 2 grains only contained 1 grain, or very little more, and it occurred to him that perhaps some mistake had occurred in labelling the bottles. These preparations were growing much in favour, but there was a tendency to give the dose in teaspoonfuls, which was very indefinite. Not only did the quantity vary with the size of the spoon, but also with the size of the granule, and he was in favour of granular preparations being made very fine, not like citrate of magnesia was usually sent out, as it greatly facilitated accurate measurement.

Mr. HARRISON asked if blank experiments were made in this investigation. He wished to emphasise the remark made by Mr. Naylor on another question, that without check experiments the value of any such results was much reduced.

Mr. OUGH said he made a check experiment in each case.

Mr. PARRY asked what was the advantage of sweetening with saccharin?

Mr. BIRD said he could quite understand that it would be easy to make variations in the strength of granular preparations if they were made as he had known them sometimes; all the ingredients being put together, quickly cohered into a semi-solid mass, which did not allow much time for the proper mixing of the medicament.

Mr. OUGH (in reply) said most of the samples analysed were taken from the original packages opened by himself. The No. 3 in each instance, which was distinctly labelled 1 grain in one

teaspoonful or in 1 drachm, came out nearly three grains. He was as much surprised as anyone at this result, and repeated the experiment several times. Even then he was not quite satisfied, and sent a sample to a friend, whose figures came out as nearly as possible the same. That sample was from a very well-known maker. He did not claim any advantage for the use of saccharin, but he was asked by a medical man to make some for experimental purposes, and therefore produced it.

Mr. OUGH was thanked for his paper.

The author gave a *résumé* of the following—

THE PHARMACY OF THE THYROID GLAND.

By EDMUND WHITE, B.S.C. (LOND.), F.I.C.,

Pharmaceutist to St. Thomas's Hospital.

The position of the thyroid gland as an article of *materia medica* may now be regarded as assured. It behoves us, therefore, as pharmacists, to provide the physician with eligible preparations of this organ which shall possess the desired activity and also uniformity of strength. I propose to bring before the Conference my experience in this direction, and by way of introduction offer a few general remarks which may be found useful.

Most of the glands employed have been obtained from the sheep, this animal being probably the most generally accessible. Occasionally those of the pig, calf, and other animals have been used, and apparently with an equal measure of success. The processes described in this paper relate entirely to the thyroid of the sheep. The anatomical position of the organ in the neck has already been sufficiently described. I should like here to emphasise one point, namely, that the *two* lobes, although easily separated, are regarded as *one* gland. The thyroid is described as a "ductless gland," its embryonic connection with the alimentary canal being eventually obliterated.

The removal of the gland from the freshly slaughtered animal must be accomplished with certain precautions. If a preparation for hypodermic injection be required the principles of modern surgery must be applied. The hands should be thoroughly cleansed, and the knife, scissors, and forceps sterilised by heat or immersion in suitable antiseptic solutions. The excised organ should be

immediately transferred to a sterilised wide-mouth stoppered bottle.

For preparations to be administered by the mouth these stringent precautions may be somewhat relaxed, strict cleanliness, in the ordinary sense of the term, being all that is necessary. Direct the slaughterman to cut out the gland with the surrounding tissue without exposing or allowing his knife to touch the gland itself. They can then be trimmed at home, and it will be found most convenient to separate the two lobes. The average weight of each lobe, when trimmed, is about 45 grains. This figure has been obtained by carefully weighing at different times nearly a thousand lobes. It must always be remembered that one is dealing with material liable to rapid putrefaction—hence the glands should be dealt with as soon as possible after removal from the body.

In the absence of any definite knowledge concerning the active principle or principles of the thyroid, the pharmacy of the subject is necessarily rather empirical. Nevertheless we easily obtain preparations which meet the requirements of practical medicine; the refinements will follow when our knowledge is more complete.

The preparations I propose to describe are:—

1. The fresh gland entire given by the mouth.
2. Glycerin extracts (a) from fresh glands, (b) after treatment with absolute alcohol.
3. Dilute alcohol extract.
4. The precipitate produced by the addition of absolute alcohol to glycerin extract.
5. The dried gland.
6. The precipitate produced by formation of calcium phosphate in glycerin extract.

With regard to the dose required, I have found that one-sixth of a gland, or its equivalent, in a suitably prepared form, daily by the mouth, gives very satisfactory results in myxœdema. For the hypodermic method a glycerin extract has been hitherto employed.

1. *The Fresh Gland Entire Given by the Mouth.*—The portion required for each dose should be finely minced, mixed with wine or other suitable flavouring agent, and swallowed. It has also been given lightly grilled, the object of this treatment being to render the dose savoury and remove the odour and flavour of raw meat.

Patients naturally have some repugnance to this method, which certainly cannot be commended for its elegance or convenience,

since each dose entails a visit to the slaughter-house. Its only advantage is to ensure, by giving the whole glandular substance, that the patient shall receive the active principle. Experience has shown, however, that preparations can be easily obtained which possess the desired activity without entailing the necessity of swallowing the structural elements of the tissue.

2. *Glycerin Extract (a) from Fresh Glands.*—The formula I have employed with uniformly good results is as follows:—

Thyroid glands	.	.	.	.	.	6 (12 lobes).
Glycerin	.	.	.	.	.	$\frac{1}{2}$ fluid ounce,
Chloroform water	}	of each	.	.	}	a sufficiency.

Slice the lobes and rub them in a mortar, with one-fourth their weight of fragments of glass, until they are thoroughly disintegrated. Then add half a fluid ounce of glycerin and the same quantity of chloroform water and macerate for twenty-four hours in a wide-mouth stoppered bottle. Express through linen or close muslin, and make the expressed fluid up to twelve fluid drachms by the addition of equal parts of glycerin and chloroform water. Twenty minims of this product are equivalent to one-sixth of a gland.

The chloroform serves the double purpose of a preservative and flavouring agent, and covers very effectually the mawkish odour of the extract. By setting it aside for a few days and then decanting from the deposit its appearance is somewhat improved; or it may be filtered almost bright through paper under pressure. The latter procedure is tedious, but amply repays the trouble it involves. The use of the glass in rubbing down the glands materially reduces labour, though it is not absolutely necessary, and may, perhaps, be thought undesirable.

I have kept this extract in a cool place for two or three months without any apparent decomposition or loss of activity. It is best given to the patient in the form of "drops," since dilution to the form of a "mixture" would render it liable to decomposition in a few days.

It may be sterilised and filtered by means of d'Arsonval's apparatus, which was described in the *Pharm. Journ.*, [3], xxiii, p. 1034. If the extract is intended for administration by the mouth, the trouble and expense involved by this procedure is certainly not repaid by any corresponding improvement in the product.

(b) *After Treatment with Absolute Alcohol.*—The glands are sliced thinly and covered with absolute alcohol for four days. They are then taken out, the adherent alcohol being removed as much as possible, and treated exactly as described under glycerin ex-

tract (a). The object of the preliminary treatment with absolute alcohol is to coagulate colouring matter and proteids, and so obtain a cleaner extract. The product is much more easily filtered, and is almost colourless. This preparation is under trial, and if its activity be proved will be a great improvement, pharmaceutically, on the ordinary glycerin extract.

3. *Dilute Alcohol Extract*.—This is prepared on similar lines to the glycerin extracts, using for each gland half a fluid ounce of 25 per cent. alcohol and making the final product measure six fluid drachms. One fluid drachm is therefore equivalent to one-sixth of a gland. The alcohol very much improves the taste and odour of the product, which, when filtered, is pale red and nearly clear. The sample shown contains 2.68 per cent. of total solids and .16 per cent. ash, equal to 8.5 grains of extractive matter for each gland employed. I have not yet had sufficient experience with this preparation to speak with certainty as to its activity, but the results hitherto obtained are promising. It is more easily filtered than the glycerin extract and not so sticky.

4. *The Precipitate Produced by the Addition of Absolute Alcohol to the Glycerin Extract*.—One fluid ounce of glycerin extract (a) poured into 3 fluid ounces of absolute alcohol yields a precipitate which can be easily filtered out and dried without heat, weighing about 64 grains, 16 grains being equivalent to one gland. This preparation has been found to be active,¹ and is pharmaceutically satisfactory. Its activity compared with an equivalent quantity of glycerin extract I have not yet had an opportunity of determining. I should suggest the addition of sugar of milk to the dry precipitate, so that 3 grains would be equivalent to one-sixth of a gland. The product is a pale grey powder with a very slight odour and taste. If stored in a dry place it would probably keep good a considerable time.

5. *The Dried Gland*.—The glands have been simply dried at a low temperature *in vacuo*, and the dry substances administered by the mouth. I have not employed this method myself. Many objections may be urged against it. It is very difficult to ensure thorough dryness without risking the destruction of the active principle, and if dessication be not complete, or if moisture gain access to the product afterwards, putrefaction will certainly set in. Moreover, the product is unnecessarily bulky. In fact, the whole idea is inelegant and retrograde.

¹ See *Deutsch. med. Woch.*, March 16, 1893.

6. *The Precipitate Produced by Formation of Calcium Phosphate in the Glycerin Extract.*—Dilute 3 fluid ounces of glycerin extract (a) with one pint of water, add 55 minims of phosphoric acid, sp. gr. 1.5, and then lime water to neutralisation. The precipitate is allowed to subside, and, after decanting the supernatant fluid, collected on a muslin strainer and subjected to strong pressure to remove the adherent liquor as completely as possible. The pressed mass is then rubbed to a coarse powder and dried at a temperature not exceeding 35° C., or over sulphuric acid. The proportions given yield rather under 18 grains of dry powder to each gland employed. After weighing the product, it is finely powdered and sugar of milk added, so that exactly 18 grains shall be equivalent to one gland.

I was led to devise this apparently somewhat strange method of procedure by the belief that the action of the gland is due to a specific ferment secreted by it,¹ and the formation of gelatinous precipitates in presence of ferments is a method commonly employed in physiological chemistry for the separation of these bodies from fluids from which they are dissolved.

The composition of the dry precipitate averages 50 per cent. organic matter, 40 per cent. calcium phosphate, and 10 per cent. moisture when dried at 120° C. It is a greyish powder, without taste or odour, and non-hygroscopic. I have kept it over six months without deterioration.

The average amount of organic matter obtained from each gland is $7\frac{1}{2}$ grains. With each 3-grain dose of the finished powder we are therefore giving only a little over 1 grain of material derived from the thyroid, and probably the greater portion of this is inert matter. I propose to apply this method to glycerin extract (b), if this be found to be active. It contains very much less organic matter, and we should therefore obtain a more concentrated preparation.

The "thyroid powder" as described above was the first dry permanent preparation introduced into medicine, and it has been used with uniform success in a very large number of cases of myxœdema.

Since it seems probable that the remedy will have to be continued for some time after removal of the urgent symptoms of myxœdema, in order to prevent relapse, I would suggest the admixture of this thyroid powder to the extent of 2 per cent. with ordinary

¹ *Brit. Med. Journ.*, Feb. 11, 1893, p. 289.

table salt, the mixture to be used by the patient in the ordinary way with food. The mixture is indistinguishable from ordinary salt in taste or odour, and would offer an easy means of supplying the remedy in a continuous and imperceptible manner.

With regard to the organic matter carried down by the calcium phosphate, I am still engaged in investigating it. Up to the present time I have not succeeded in isolating any single substance to which its activity can be referred. I am, however, hopeful of ultimate success, but progress in this direction is very slow, since we are obliged to depend upon clinical results as a means of ascertaining the activity of any given preparation.

In conclusion, I should like to state that I do not profess to have arrived at perfection in the various preparations described. I simply desire to state my experiences, trusting that pharmacists will take up the work and show the medical profession that they are competent to deal with this comparatively new branch of the healing art. By doing so they will not only enhance their reputation, but at the same time retain a considerable business in their own hands which otherwise will inevitably drift into the hands of large manufacturers. I must also add that I consider it subversive to the true interests of pharmacy to apply to any preparation a specific name or title indicating that it is the active principle of the thyroid gland until we really know what the active principle is.

The PRESIDENT said the Conference was much obliged to Mr. White for this paper. It might be a question whether this remedy was likely to come into much practical use, but it was very satisfactory to find that modern pharmacists were equal to the demands made upon them in the case of these new remedies.

Mr. J. LAIDLAW EWING said Mr. White had done a great service in bringing forward this paper. He was often asked how long the glycerin preparation would keep, but had not been able to give a satisfactory answer, and should be glad to have any further information on that point. According to his experience the hypodermic extract had fallen into disfavour in Edinburgh, owing to one or two cases of blood poisoning from its use.

Mr. GERRARD said this novel branch of *materia medica* possessed great interest, and he felt sure that the pharmacy of the subject would be much developed in the future. Nothing had been introduced of any importance in the way of what might be called

animal *materia medica* since the days of pepsin and pancreatin until now, and as they were all very much in the dark as to what the active constituent of the thyroid gland was, they could not do more than devote their attention to making galenical preparations which should at least represent the full activity of the drug. There was something attractive, interesting, and mysterious about this article. Mr. White said it might be given slightly grilled, and prove serviceable, and on the other hand he rather objected to the drying of the gland itself; he did not quite see how these two views were to be reconciled. He had been engaged in making preparations of this article, the glands being brought him daily by the butcher. His method was to remove all extraneous matter as far as possible, slice finely, and rub it through a fine sieve of iron wire; it was then scraped off the under side of the sieve, placed on porcelain or glass, and dried at a temperature of about 100°, and at this time of year it would dry very rapidly, if spread thinly; when dried it could be pulverised, and in that condition it was fully active, but he could not claim that it was an elegant preparation. It might be diluted with sugar of milk or phosphate of calcium. He must emphasise the importance of drying it rapidly, as if left too long it decomposed quickly, and changed into a peculiar black substance. He believed almost any quantity of thyroid gland could be taken without producing deleterious effects; at any rate he had some experience of this as far as the lower animals were concerned, for on one occasion a friend called to see him, bringing a dog with him, and there being a number of glands lying on a bench, the dog smelt them out, and ate them. It would be interesting to know whether the active principle was a proteid; he took it from Mr. White's results that it was not, but he should like to hear Mr. White's opinion; if it were, alcohol would not dissolve it, and therefore an alcoholic solution would not be efficacious. At first he thought it must turn out to be one of those active proteids of the albumose class, but Mr. White's experiments indicated differently. He should be pleased to find that an active preparation could be made with weak alcohol, as it would put into the hands of every pharmacist the means of making his own preparation of this very useful substance.

Mr. C. SYMES said the introduction of this preparation and that of another fluid prepared from the testicle of the calf almost made one doubt whether the old practitioners who used to prescribe dried serpents, snails, and so on, were so stupid after all. There seemed a tendency of late to revert to the ancient style of pharmacy.

He had had some experience in this matter, and could not agree with Mr. Ewing that hypodermic preparations of the gland were falling into disuse, and introduction by the mouth substituted. He had sent out some dozens of tubes for hypodermic use, and had never heard of any unfavourable result. In each case they were very carefully prepared, the glands being obtained from the slaughter-house by a medical man, and every precaution was taken to prevent contamination of any kind. In one case a lady, who was deriving considerable benefit from the hypodermic injection, wished to take it in another form, and some compressed tablets of the dried material were obtained, but they failed to produce the same effect, and the patient went back to the injection.

Mr. RAIT said two medical men in the West of Glasgow had been using this preparation, and found that abscesses formed as the result of subcutaneous injection, and they were of opinion that large doses did not suit. There was one case of a lady who was under treatment for two months with marked success, but very small doses were given.

Mr. HARRISON said he noticed that Mr. White took the gland as his unit of measurement, both with regard to the dose and strength of these preparations, not any definite weight. It occurred to him that the glands would probably vary a great deal in size, and whatever the active principle might be, that a large gland would presumably contain more than a small one; and if that were so, the glycerin and other preparations would vary in strength accordingly.

Mr. J. RUTHERFORD HILL said, as far as he could gather, this article was not a cure, but rather a palliative, the patient going back again if the use of the drug was discontinued, so that the remedy had to be taken constantly. That being so, he doubted whether any preparation containing glycerin was an advisable one to use, because it had been found again and again that for some reason, which he did not understand, the use of glycerin after a short time induced a feeling of revulsion in the patient, and it became so nauseous that they would absolutely refuse to take the medicine which contained it. In this case, any preparation to be taken by the mouth should be one which could be continued for an indefinite time without producing disgust. He was not sure that mixing it with salt and taking it along with the ordinary dietary would not be the best form of administration. In Edinburgh the glands themselves in a kind of half-cooked condition were given, and with good results. The only cases in which this

remedy seemed to have had a permanent curative effect were those of young growing people, who perhaps were suffering from some functional disturbance which only needed to be removed to enable the system to throw off the disease. In the case of myxœdema it only seemed to be a palliative, and must be continued indefinitely; it was therefore a question whether the admixture with calcium phosphate might not give rise to the possible danger of calculous.

Mr. W. H. SYMONS said there was another point also to be borne in mind. The thyroid gland was known to contain many products similar to uric acid, and it had recently been pointed out that persons taking this remedy had suffered from uric acidæmia. It struck him that this might be to a large extent avoided if it were found that the preparations previously treated with alcohol were equally effective in treating myxœdema. He did not know whether Mr. White's experiments enabled him to say what the alcohol removed from the gland, and they had yet to discover to what the thyroid gland owed its activity, but if the waste products could be thus removed without injury to the remainder, so much the better.

Mr. WHITE, in reply, said he had proved that the extract made with chloroform water could be kept for several months without any change, provided you had a well stoppered bottle which prevented the evaporation of the chloroform, otherwise it would go wrong. The great point was to have the glands perfectly fresh, and have the most thorough cleanliness. He could endorse what had been said about the hypodermic solution; it was a great worry, and he should advise pharmacists to steer as clear of it as possible. Dr. Symes said he had had no trouble, but that might mean simply that he had not heard of any complaints. In nearly all cases it produced a number of little lumps at the point of injection, and occasionally abscesses. Satisfactory results could only be ensured by very great and constant care, and by making the extract fresh as wanted. For administration by the mouth, one could make a two months' supply at once, but for hypodermic use he should not like to employ anything more than a week old. The apparent contradiction to which Mr. Gerrard referred was apparent only. When the glands were slightly grilled it only affected the outside, and gave a savoury odour and taste, but the interior was hardly warmed; if they were thoroughly cooked he had no doubt they would be quite inactive. Mr. Gerrard was in error also in his remark as to the perfect harmlessness of this organ. Several fatal cases had occurred from overdoses, and the analogy between

the dog and the human subject must not be carried too far. Overdoses had a very bad effect, especially if exercise were taken immediately afterwards. The gastric juice of the dog was very strongly acid, and that acidity might possibly destroy the active principle of the gland. What the active principle really was, still remained matter for speculation. He held that it was a ferment, for the following reasons:—the structure of the organ was typically glandular; at one time it was connected with the alimentary canal much in the same way as the pancreas or liver, and there was every reason to suppose that it had a somewhat similar function. The only difference between it and the pancreas was that the duct was eventually cut off from the alimentary canal, and the secretion, instead of getting thus into the canal, reached the blood in some other way, probably through the lymphatic system. It might be a proteid, or it might not, and that raised the question whether alcoholic preparations would be active or not. He had employed dilute alcohol, and if it were a ferment the dilute alcohol would probably extract a considerable amount; otherwise pepsin wine would be inactive. He used 25 per cent. absolute alcohol, which was equivalent to about 20 per cent. when diluted with the juices of the gland. He thought the remark of Mr. Symes about the old practitioners' use of snakes and toads was scarcely apropos, since modern developments in this line were strictly based on physiological facts. One knew that removal or injury of the thyroid gland was followed by symptoms very similar to those of myxœdema, and that suggested the application of this remedy. It was not a case of merely hitting on it by accident, but the practice of their forefathers was not dictated by any such reasoning. He had met with several instances where tabloids had been inactive, but had put it down to carelessness probably in the drying; and that was one great objection to using the dried glands. With regard to taking the lobe as the standard for the dose, he might say that two sheep of the same weight would often have glands of very different size, perhaps twice as large in one case as in another; but those with the small glands seemed to live as satisfactory lives, and it seemed reasonable to suppose that the smaller gland might be of higher activity. As the active principle was not known one could not give precision to the dose. One seldom worked on one or two lobes only, probably on two or three dozen, and thus an average result was got, which was more satisfactory than taking the dosage by the actual weight of the gland itself. With regard to the permanent effects of this remedy, he

had seen many cases which might be regarded as cures, with the reservation that the remedy must be continued, but naturally the degree of relief depended very much on the age of the patient. A young person naturally recovered more quickly, but in practically all the cases he had seen a complete cure was effected. The objection to the use of glycerin as a menstruum must be a little qualified by the fact that it was only necessary to give 5 minims a week of the glycerin extract after the cure had been effected, and a stomach must be very sensitive indeed which could not tolerate that. The same remark applied to the objection to calcium phosphate with common salt: taking 2 per cent. of calcium phosphate one would be taking only from 4 to 6 grains per week, and most people took a much larger amount than that in their ordinary food. Mr. Symons had referred to the advantages of the alcoholic preparation if effective, and no doubt that was correct. It was nice and clean, free from blood, and contained very little organic matter. If it proved active it would confirm his opinion that the active principle was a ferment; pure strong glycerin dissolved out very little proteid matter indeed after treatment with absolute alcohol.

Mr. CURRIE asked if the efficacy of this agent depended at all on the age of the sheep, and suggested that it would be very desirable to have clear evidence as to the health of the animal, or evil results might follow.

Mr. WHITE said he could not offer any suggestion as to age, but naturally one would not expect to find very old sheep at a respectable butcher's. There must always be a certain amount of risk about the health of the sheep; it would be nice to have a veterinary surgeon's certificate in each case, but it hardly seemed practicable, and he had never heard of a case of disease being communicated. But this consideration made it more desirable still to use an alcoholic extract rather than the gland itself. In the latter case you would be sure to give the disease, if it were there, as well as the active principle, but if the gland were treated with absolute alcohol, and then dried and extracted with pure glycerin, there was a chance of excluding the diseased matter.

A vote of thanks was accorded Mr. White for his interesting paper.

In the absence of the author the following paper was read by Mr. W. A. H. Naylor.

PAPAIN.

BY FREDERICK DAVIS, B.Sc.

Papain is the active principle of the *Carica papaya* or papaw tree. This plant, a native of South America, West Indies, and other parts enjoying a tropical temperature, I am informed by Mr. Jackson, A.L.S., of Kew, varies in height from five to twenty feet, according to age. It is of an herbaceous character, and when well founded bears a plentiful and continuous supply of fruit.

The cylindrical trunk is simple, and bears at the summit a tuft of palmately-lobed leaves.

The stamiferous flowers are arranged in a racemose manner, whilst the pistillate flowers are for the most part sessile.

The plant is dioecious, belonging to the Passifloræ. The trunk and leaves abound in a milky juice, which possesses the power of rendering the toughest meat tender in a very short period of time.

The fruit termed the "papaw" is employed by the natives in a variety of ways, in its unripe state being boiled and used as a vegetable, and in its ripe state eaten as dessert. The leaves are used in washing in the place of soap. Papain may be prepared from the juice of the plant by treating with alcohol, dehydrating the resulting precipitate and extracting with water, preferably at a temperature from 36° to 40° C. The commercial varieties differ largely, not only in colour and appearance, but to a great extent in proteolytic action. The colour varies from light brown to nearly white, and I have observed generally the more nearly colourless the sample the greater its activity. Papain is an albuminoid body, but differs from peptones in the fact of not yielding a precipitate with either acetate of lead or perchloride of mercury.

As previously stated, the commercial samples of papain vary considerably. I therefore considered it necessary to subject some of these to dialysis, thus obtaining the active principle in a fairly pure state. It may be on this account that past researchers obtained such varying and conflicting results.

If a larger quantity of water be employed in experimenting with the same quantity of papain and dried fibrin or albumin it will be found to influence the final results very markedly, also that with a larger quantity of water, a smaller quantity of the same sample of papain and the same quantity of fibrin a different

digestive result is arrived at, the temperature being maintained throughout at 35° C

Albumin was employed in the following instances, being more reliable for experimental purposes than dried fibrin.

Experiment No. I.

Albumin	3 grammes.
Papain	·3 gramme.
Distilled water	50 c.c.
Digested 38 hours at 35° C.	

Neutral Solution.

Result:—

Digested	1·785
Residue	1·215

Experiment No. II.

Albumin	3 grammes.
Papain	·25 gramme.
Distilled Water	100 c.c.
Digested 48 hours at 35° C.	

Neutral Solution.

Result:—

Digested	1·935
Residue	1·065

Experiment No. III.

Albumin	3 grammes.
Papain	·3 gramme.
Hydrochloric acid	(·005 per cent.)
Water to	500 c.c.
Digested 48 hours. Temperature 35° C.	

Result:—

Digested	2·005
Residue	·995

Experiment No. IV.

Albumin	3 grammes.
Papain	·3 gramme.
Hydrochloric acid	(·050 per cent.)
Water	500 c.c.
Digested 48 hours. Temperature 35° C.	

Result:—

Digested	none.
Residue	3 grammes.

With a higher percentage of acid the results compare with the

last experiment, namely, no conversion into peptones whatever. The presence or absence of peptones was ascertained by the copper test. With regard to digestion in alkaline solution, papain is found to increase in proteolytic action if the alkalinity is not above .25 per cent., carbonate of soda being employed for the purpose.

Experiment No. V.

Albumin	.	.	.	.	.	3 grammes.
Papain	.	.	.	.	.	.3 gramme.
Sodium carbonate	.	.	.	.	.	(.25 per cent.)
Water	.	.	.	.	.	100 c.c.

Digested 48 hours. Temperature 35° C.

Result :—

Digested	.	.	.	.	.	2.358.
Residue	.	.	.	.	.	.642.

Experiment No. VI.

Albumin	.	.	.	.	.	3 grammes.
Papain	.	.	.	.	.	.3 gramme.
Sodium carbonate	.	.	.	.	.	(.20 per cent.)
Water	.	.	.	.	.	500 c.c.

Digested 48 hours. Temperature 35° C.

Result :—

Digested	.	.	.	.	.	2.507.
Residue	.	.	.	.	.	.493.

Digestion takes place in media containing a much larger percentage of sodium carbonate, but in no way approaching the above results. The action of papain with milk is in every respect in ratio with the foregoing results, but the fat is not in any way emulsified, excepting of course to the extent of the alkalinity of the medium. Recapitulating, we find papain to be active as a digestive in neutral and weakly alkaline media, but its action entirely stopped by the presence of .050 per cent. of hydrochloric acid.

Statements have been made that "papain" is capable of digesting living tissue, and an experiment is quoted in Christy's "New Commercial Plants and Drugs" (No. 8), where Professor Finkler says he found certain preparations of papain to dissolve living frogs and worms. I have experimented largely in this direction, and can say positively the frogs were in no case digested; death occurred, and the amphibian decomposed, but no peptones were formed. In fact, the acid developed in the dermis of the frog

is sufficient to prevent the action of papain. Papain appears to act as a poison to the frog. The creature will not live for long in a solution of papain, but decomposition certainly does not take place until after the death of the animal. I think, therefore, nothing further need be said upon this point.

With regard to the products of fermentation by the action of papain upon proteids, I have found undoubtedly a resemblance to that of trypsin, and by following the suggestions of Dr. Sidney Martin, of University College, proved positively the formation of various amido-acids, tyrosine, and leucine, and by further decomposition indol was produced.

In conclusion, I have to thank Dr. Sidney Martin for most valuable suggestions.

Mr. PARRY said some perhaps had seen a pamphlet lately published in which it was stated that papain was active in an acid solution; in fact, the statements in it were diametrically opposed to those now put forward. He should like to know if there was any explanation of this discrepancy, or whether it must be taken to arise from the different motives of the authors.

Mr. GERRARD regretted the author was not present to explain his views more fully. He had had some experience of the action of ferments on albumin, and it was a novelty to hear that papain acted in the presence of both acid and alkaline solutions. He should have liked to ask Mr. Davis how he determined the development of the digestion and the formation of the peptone. It was easy to say that a substance was digested; but the mere fact that albumin passed into solution was not a proof of it. Acids and alkalies acted on albumin to form acid and alkali albumin, but you must not only prove the presence of peptone by the copper test; you must take some sulphate of ammonium, either in concentrated solution or as a salt, and add that, when all proteids but the peptones would be precipitated; then you must remove the ammonium sulphate by means of baryta by a very lengthy process. It was only in that way that you could really prove that a substance had been peptonised. He had always found it very easy to peptonise albumin in the raw state when diluted with water, and the greater the dilution the more rapidly would it peptonise. With any of these ferments in an active condition, with a proper percentage of acid, and at the proper temperature, digestion was very rapid; and the finer you divided the albumin if it were coagulated the

sooner would the operation take place. It was aided by motion of the particles, and no doubt the motion going on in the stomach was useful in this way. He did not expect papain would digest living tissue, but no doubt a solid piece of dead meat or dead frog if placed in a ferment would undergo digestion superficially, because only the surface would be in contact; if you cut up the meat and exposed a large surface digestion would proceed. In his experience, papain was most used in removing diphtheritic membranes, being painted on in a strong glycerin solution and the throat afterwards mopped out with a strong solution of chlorinated soda. This was a very effective and popular remedy.

Mr. DRUCE said Mr. Ball gave, in the *Year-Book* for 1889, the results of some experiments on pepsin and papain. He found that with hydrochloric acid pepsin dissolved 1.3 per cent., while papain yielded only .34, but his results showed that an acid solution did not stop the digestibility of the albumin. He understood that the papaw tree was so widely cultivated that its real origin (probably of tropical America), (Hemaley, *Biol. Cent. Amer.*, 1, 480) was rather doubtful.

The PRESIDENT said he thought it was a native of the Caribbean Sea.

Mr. DRUCE said he scarcely knew whether it was a true species at all, it had been much altered by long culture or prehistoric hybridisation (cf. Sohns Laubach in *Bot. Zeit.*, 719, 1889). There was no doubt that the fresh leaves had a wonderful power in disintegrating tissue. The natives had used the leaves from time immemorial for wrapping up tough meat in before cooking, and this was found to make it fairly tender. Papain was well known as a useful agent for removing diphtheritic membrane, and was also used for similar diseases of the throat in birds and animals.

Mr. NAYLOR said it was rather difficult to follow a paper of this kind, but it must be distinctly understood that Mr. Davis did not state that albumin was not digested at all in the presence of acid and papain, but that when the acid reached a certain percentage the proteolytic action ceased.

Mr. Davis was thanked for his paper.

In the absence of the author the following paper was read by Mr. Ransom. This and the succeeding paper were discussed together.

THE IPECACUANHAS OF ENGLISH COMMERCE.

BY E. M. HOLMES, F.L.S.

For some months past attention has been directed to the inferiority in character of recent importations of ipecacuanha, due to the large admixture of the woody stem with the root. Conflicting statements have been published regarding the relative proportion of alkaloid present in the stem and in the root. According to a series of careful analyses recently made by Messrs. Paul and Cownley (*Pharm. Journ.*, [3], xxiv., 61), the stem appears to contain about one-third less of alkaloid than the root. But the chemistry of ipecacuanha has never been thoroughly worked out. It has been stated that the root contains emetine, choline, and a volatile alkaloid, and Messrs. Paul and Cownley have recently proved that the so-called emetine is by no means pure, but contains, mixed with it, a crystalline alkaloid that is present in greater quantity in the stem than in the root. They have, moreover, shown that Carthagena ipecacuanha also contains a crystalline alkaloid which is not identical with that obtained from Brazilian ipecacuanha. We may, in fact, be said to be practically ignorant how far the properties of the drug are due to amorphous emetine or to the crystalline alkaloid, and therefore how far the percentage of emetine (so-called) may be taken to indicate the medicinal value of the root. It seems highly probable that the medicinal value of the root does not depend upon emetine entirely, since results are obtained by the powder that cannot be obtained from emetine.

I have thought, therefore, that at the present time it might be useful to direct attention to the varieties and qualities of the drug as met with in commerce, and to append a histological table by which the spurious ipecacuanhas that occasionally enter the London drug trade may be detected by the retail pharmacist, for upon him the responsibility rests of securing for the public pure drugs, a responsibility which is too often relegated to the wholesale druggist.

The ipecacuanhas of English commerce may be divided into two sections,—

1. Those that are derived from the genus *Cephaelis*.
2. Those that are derived from other genera belonging to the same or to different natural orders.

1. OFFICIAL IPECACUANHA (*Cephaelis Ipecacuanha*, Rich.).—Of this kind there are several commercial varieties or qualities.

A. Brazilian or Rio Ipecacuanha.—When of good quality the roots are one or two lines in diameter, and externally of a reddish or blackish-brown colour. Specimens without a powdery surface are to be preferred, since the powdery appearance is often due to the remains of moulds. A good sample should yield about 80 per cent. of bark.

B. Indian Ipecacuanha.—This is derived from the plant cultivated in Johor (Straits Settlements), and has only been introduced during recent years. It is imported from Singapore. Commercially it is distinguished from the Brazilian kind by the presence of the delicate rootlets, which usually occur to a much smaller extent in the South American drug. According to an analysis by Mr. Ransom¹ it contains 1·7 of (the so-called) emetine as against an average of 1·66 per cent. in the Brazilian kind, and may therefore be supposed to be of good quality.

C. Mouldy Ipecacuanha.—It is calculated that about three out of every four serons of ipecacuanha root imported have been damaged by sea-water during the voyage to Europe or during transit to the coast from the place of collection (*Pharmacographia*, 2nd ed., p. 375). It has been maintained by some that the mouldiness does not affect the amount of alkaloid present. This statement needs confirmation.

D. Woody Ipecacuanha.—It is of the prevalence of this quality in commerce that complaints have recently been made. It is characterised by the presence of an unusual amount of stem. A small piece of the woody stem is often attached to the root in good samples, but in woody ipecacuanha it may amount to 30 or 50 per cent. of the whole. The stem is easily recognised by its smooth not annulated surface, remarkably thin bark, and by the presence, visible under a good lens, of pith in the centre of the woody column. As the stem is not official in the Pharmacopœia, and is probably one-third weaker than the root, it should not be used for pharmacopœial preparations. It is obvious that in croup, or in cases where a prompt emetic is required, preparations made from such a root, and therefore deficient in medicinal activity, might lead to fatal results.

E. Doctored Ipecacuanha.—This quality consists of inferior, woody, or mouldy ipecacuanha that has been washed and dried. It has a dark colour and clean epidermis, contains few large pieces, and the bark has been much broken off the root in the

¹ *Pharm. Journ.*, [3], xviii., 400.

process of washing. By this latter character and its dark colour it is easily recognised.

2. CARTHAGENA OR SAVANILLA IPECACUANHA (*Cephaelis acuminata*, Karsten ¹).—This kind of ipecacuanha has recently been imported in increasing quantities.² It is, however, by no means a new article in commerce. It is probably identical with the grey annulated ipecacuanha of Pereira, which he describes as "occurring in pieces of larger diameter than ordinary ipecacuanha, with fewer, more irregular and less prominent rings." Professor Guibourt remarked that considerable quantities of it arrived unmixed with the ordinary sorts, and that he thought it to be a distinct kind coming from a different part of Brazil, and derived from another species of *Cephaelis* (Pereira, *Mat. Med.*, vol. ii., pt. ii., p. 58). This description is exactly applicable to the Carthagena ipecacuanha of the present day, which is characterised by the less prominent and more distant rings and transverse fissures.

Under the microscope it presents, according to Karsten,³ a distinctive feature in the fact that the cortical parenchyma forms two distinct layers, which is not the case in ordinary ipecacuanha. The radiate structure of the central woody column is also more distinctly visible than in the ordinary ipecacuanha.

Carthagena ipecacuanha has been analysed by Dr. Wimmel,⁴ Conroy, and others, and the results obtained indicate that it varies, like the Brazilian drug, in percentage of alkaloids, but that on the whole it is probably not inferior to it in the amount of alkaloid present. It must be remembered, however, that it contains a different crystalline alkaloid which is not chemically identical with that of the Brazilian drug. The root of *Cephaelis Ipecacuanha* has been figured in several works on materia medica, of which the following may be mentioned: Goebel and Kunze, "Waarenkunde," tab. xxx., fig. 1; Martius, "Specimen Mat. Med. Bras.," tab. i. and viii., fig. 1, 2; Pereira, "Mat. Med." (1887), vol. ii., part ii., p. 57, fig. 8; Planchon, "Hist. Nat. des Drogues Simples" (7th ed.), vol. iii., pp. 85, 86, figs. 599–600. The microscopical structure has also been fully illustrated in Berg. "Anat. Atlas," part vii., A. and B.; Vogl. "Anat. Atlas," tab. xlvii., figs. 1–3; Heraul and Bonnet, "Bot. Méd.," part vi., fig. 169; Moller,

¹ "Med. Deutsch Flor.," p. 1197.

² Specimens in the Hanbury materia medica collection bear the dates of importation, viz., 1864, 1868, 1872.

³ *Pharm. Centralh.*, 1892, p. 689.

⁴ *Pharm. Journ.*, [3], xxiii., 267.

"Lehrbuch der Pharmacognosie," p. 312, fig. 169; Tschirch and Ludtke, "Archiv. der Pharm.," 1888, pp. 444, 445, figs. 1, 2, 3.

SPURIOUS IPECACUANHAS.

Owing to the name "Poaya" being used in a generic sense in South American countries for roots possessing emetic properties, various drugs bearing this name are sent to this country by merchants at intervals of a few years. Sometimes these meet with purchasers, but their ultimate destination is involved in obscurity. None of them approach ipecacuanha in therapeutic value. Hence a description of their appearance in the crude state may prove useful.

The plants from which these Poayas are derived belong chiefly to the natural orders *Rubiaceæ* and *Violaceæ*, and one to the *Polygalaceæ*.¹ Those which have been identified in English commerce are three in number, viz.: (1) *Psychotria emetica*, (2) *Richardsonia scabra*, and (3) *Ionidium Ipecacuanha*.

Several other spurious ipecacuanhas, more or less resembling these three, have at intervals been imported into Europe, but probably have not been distinguished from them, except in one or two cases, in which a microscopic examination has been made. Of these I only propose to notice those that have been met with in commerce in this country. A large number of others obtained from International exhibitions and Continental museums have been examined by Messrs. Tschirch and Ludtke, and structural details have been given in the *Archiv. der Pharm.*, 1888, p. 444, etc.

A. BLACK OR GREATER STRIATED IPECACUANHA (*Psychotria emetica*, Mutis).—This is so-called from its black epidermis. The root is slightly larger than Rio ipecacuanha and strongly constricted at intervals of about an inch, more or less, the intermediate portions being cylindrical and striated longitudinally. Internally the cortical portion is thick in proportion to the woody column, and presents a horny appearance, and sometimes a purplish tint. A decoction of the root gives evidence of the presence of a reducing

¹ The name "Poaya verdadeira," or "Pcaya de botica," or "Poaya preta," is applied to *Cephaelis Ipecacuanha*, Rich.; "Poaya branca" to *Richardsonia scabra*, DC., and *Ionidium Ipecacuanha*, Vent.; "Poaya do campo" to *Borreria Poaya*, DC., and *Polygala Poaya*, Mart.; "Poaya de praia" to *Borreria ferruginea*, DC., *Machaonia Brasiliensis*, Willd., and *Ionidium ipecacuanha*, Vent.; "Poaya do rio" to *Machaonia Brasiliensis*, Willd.; "Poaya de hasta com-prida" to *Borreria emetica*, Mart., "Syst. Mat. Med. Bras.," pp. 92-94.

sugar,¹ but not of starch. According to Mr. F. Ransom it contains traces (·016 p.c.) of emetine, or of an alkaloid giving the same reactions. The woody column is dense, and not visibly porous.

B. LESSER STRIATED IPECACUANHA (*Richardsonia species*).—This drug externally has also a black colour and striated appearance, and constrictions at intervals like the greater striated ipecacuanha, but it presents marked differences internally. The cortical portion is often of a dark violet tint, and is full of starch, which can readily be detected in the cold decoction by iodine, and the woody column is seen to be distinctly porous when viewed under an ordinary lens. Professor Planchon refers it provisionally to the genus *Richardsonia*.² Examined by F. Ransom it was found to contain ·027 of emetine.³

C. UNDULATED IPECACUANHA (*Richardsonia scabra*).—Externally the root is of a greyish brown colour, and differs from ipecacuanha in not having raised rings. It is, however, marked with deep constrictions, often on alternate sides, which gives the root a somewhat undulated or falsely annulated appearance. In transverse section the root is seen to be white, and starchy, and sometimes has a faint violet tint, and the woody column is yellow and porous. It has been stated to contain emetine, but the statement needs confirmation.

D. (1) WHITE IPECACUANHA, IONIDIUM IPECACUANHA.—This drug differs from the foregoing in its pale yellowish-brown colour and much branched character. The woody column is large, yellow and porous, and the cortical portion is thin, so that the root is more woody in character than *Richardsonia*, but it has transverse fissures and constrictions like the latter. It does not contain starch (Moeller, "Lehrbuch für Pharmacognosie," p. 313).

D. (2) A root, supposed to be that of *Ionidium Ipecacuanha*, entered the London market in 1884, and was examined by Mr. W. Kirkby, who pointed out that it differed from the root of that plant in having large wedge-shaped groups of sclerenchymatous cells in the cortical portion, and more or less broad medullary rays in the woody column (*Pharm. Journ.*, [3], xvi., 126).

E. FALSE INDIAN IPECACUANHA.—Some years ago a quantity of a small root said to be imported from Southern India, was offered in the London market as ipecacuanha.⁴ It differs from true

¹ *Pharm. Journ.*, [3], xviii., 788.

² *Journ. de Pharm.*, xvi. (1872), p. 400; xvii., p. 19.

³ *Pharm. Journ.*, [3], xviii., 788.

⁴ *Pharm. Journ.*, [3], xviii., 628. "Pharmacographia Indica," vol. iii., p. 518.

ipecacuanha in colour, which is of a pale reddish-brown, but it presents a ringed appearance.

A transverse section, however, shows that the hard, woody central column so characteristic of ipecacuanha is absent, and that the root has a monocotyledonous structure. Its rhizomatous character—for the rings indicate the remains of leaf bases—its slightly acrid taste, and the small starch grains present in its tissue, show that it probably belongs to the *Aracæ*. It has been referred to *Cryptocoryne spiralis* and to *Lagenandra lancifolia*, but I have not been able to identify it with either of these species as represented in the Kew Herbarium.

The following key to the microscopical structure of the commercial ipecacuanhas may perhaps prove useful to pharmacists. It is based upon a paper on this subject by Tschirch and Ludtke in the *Archiv der Pharmacie*, 1883, p. 441. Several of the varieties mentioned by these authors have not been met with in English commerce. On the other hand, some are now added which have appeared in English commerce, but do not seem to occur in their list.

- I. Woody column containing chiefly tracheids, but no vessels.
 - A. Root bark containing starch and raphides.
 1. Parenchyma of bark uniform = *Rio Ipecacuanha*.
 2. Parenchyma of bark forming two layers = *Carthagena Ipecacuanha*.
 - B. Root bark containing no starch, but sugar.
 - Woody centre, not visibly porous = *Greater Striated Ipecacuanha*.
- II. Woody cylinder containing vessels, wood-cells, and medullary rays.
 - A. Root-bark, containing starch.
 1. Medullary rays composed of a single row of cells; woody centre visibly porous = *Lesser Striated Ipecacuanha*.
 2. Medullary rays forming two or three rows of cells = *Undulated Ipecacuanha*.
 - B. Root-bark containing inulin.
 1. Medullary rays of a single row of cells, no starch, sphaeraphides in the bark = *White Ipecacuanha (a)*.
 2. Bark contains stone cells.
 3. Medullary rays broad = *White Ipecacuanha (b)*.
- III. Rhizome having a monocotyledonous structure, brown pigment cells in parenchyma, acicular raphides and starch present = *False Indian Ipecacuanha*.

It should be remarked, in conclusion, that although it is com-

paratively easy to identify any of the spurious ipecacuanhas by their microscopical structure and external characters as seen under a good lens, it is by no means so easy to detect the presence of the spurious roots in powder, since in several of them starch and acicular raphides are present, and the starches can only be determined by careful and repeated examinations and measurements. It may be hoped, therefore, that a process for obtaining emetine in a pure state will soon be devised, so that it may be possible to obtain a standard for genuine powder. Until then chemists will do well to purchase ipecacuanha root containing as little stem as possible, and to powder it themselves. In this way only is it possible at present to personally guarantee satisfactory preparations.

The next paper read was entitled :—

DEËMETINISED IPECACUANHA.

By F. C. J. BIRD.

Ipecacuanha deprived of its emetine appears to have been first suggested as a remedy in dysentery by Surgeon Major Harris, of Simla, who, in a letter to the *Lancet* (Aug. 30, 1890), pointed out that the deëmetinised root answered equally as well as ordinary ipecacuanha in the treatment of that disease, whilst it possessed the great advantage of avoiding the extreme nausea and depression hitherto inseparable from the administration of the drug. So distressing are these effects, remarks the same writer, that it is difficult to adequately conceive the fearful feeling of depression caused by 30-grain doses, and patients who have had previous attacks of dysentery justly look forward with dread to a further experience of the same remedy.

Since the appearance of the letter alluded to, other investigators have taken the matter up and published more or less conflicting results. Indeed, in the hands of Surgeon Captain Walsh, the deëmetinised preparation was found to be of such little value that he attributed the antidysenteric action of ipecacuanha entirely to the emetine contained in it. Quite recently, however, Drs. A. A. Kanthack and A. Caddy have contributed a very interesting report to the *Practitioner* (June, 1893), in which they clearly proved deëmetinised ipecacuanha to be of the greatest value in the treatment of dysentery, and the discordant conclusions of different ob-

servers to have arisen from the imperfect methods by which the removal of the emetine had been attempted. They found the various samples of the preparation which they were able to obtain to be of very varying efficacy, different processes having probably been followed in their production. They included in their investigation samples procured from six different sources (three Indian, two English, and one German), and in addition to physiological trial, they estimated the percentage of emetine and extractive soluble in alcohol in each. The emetine varied from traces to 1.2 per cent., whilst the yield of alcoholic extractive was from 2.5 to 11.3 per cent. The antidysenteric value was in direct proportion to the amount of alcohol-soluble substances present, provided that the emetine had been completely removed or existed in very minute quantity. The sample which gave the best results in the hands of the authors of the paper was of German origin, and showed on analysis traces of emetine with 10.3 per cent extractive soluble in alcohol. They stated further that "this manufacturer alone had succeeded in removing as much of the emetine as could be expected without appreciably disturbing the other constituents of the root." Allusion was made to this report in the *Pharmaceutical Journal* of June 3 last, by a writer in the "Month," who, whilst remarking the want of details of the processes by which the samples employed by Drs. Kanthack and Caddy were prepared, indicated the desirability of a satisfactory method of extracting the emetine without affecting the other constituents.

Surgeon Major Warden, in 1891, deëmetinised ipecacuanha by percolation with alcohol acidulated with acetic acid, and other solvents that have been suggested to me as giving good results are alcohol and ammoniated chloroform. In the light of Drs. Kanthack and Caddy's analyses, the two first may be at once dismissed as unsuitable, removing as they do the antidysenteric principle in the alcoholic extract. Further, it appeared desirable to avoid the use of alkali if possible, so that the natural state of combination of the constituents of the root might remain unaltered. Twenty grammes of Rio ipecacuanha in No. 80 powder were therefore extracted in a Dunstan and Short's apparatus with plain chloroform, first cold, and then boiling. The operation was a tedious one, and although the bulk of the alkaloid was removed the residual powder, when dried with milk of lime, digested with chloroform, and evaporated, gave a distinct precipitate with dilute acetic acid and Mayer's reagent. The chloroform removed from the above quantity of root .573 gramme extract, equal to 2.86 per cent., and the

extract obtained by afterwards percolating the residue with strong alcohol weighed 1·951 gramme, equal to 9·75 per cent. Seeing that the nearly complete removal of the emetine is so important, chloroform alone as a solvent cannot be recommended.

Another experiment was made, using ammoniated chloroform prepared as in Ransom's assay process by agitation with liq. ammon. fort. in a separator. In this case extraction was effected very readily, and the residual powder, when treated as before, gave a scarcely perceptible cloudiness with "Mayer." The extract was, however, much darker in colour than that from plain chloroform. Dried in a water oven it weighed ·720 grammes, equal to 3·6 per cent.

The residue in the percolator, after drying, was extracted with strong alcohol and the solvent evaporated. This extract weighed 1·803 gramme, equal to 9·01 per cent.

The ammoniated chloroformic solution from another 20 grammes of root was washed several times with dilute sulphuric acid to remove the emetine and then with distilled water. On evaporating the chloroform an extract remained weighing ·312 gramme, equal to 1·56 per cent. It gave no reaction either for sulphates or alkaloid.

This extract dissolved almost entirely on treatment with warm alcohol. The solution filtered and evaporated to dryness left a residue weighing ·302 gramme, equal to 1·51 per cent., thus showing a loss of ·05 per cent. due to matter insoluble in alcohol.

The alcoholic residue having been dissolved in a sufficient quantity of chloroform was returned to the 20 grammes of powder from which it had been obtained, the whole uniformly mixed, and the chloroform allowed to evaporate. The product was a pale brown powder, containing but a trace of emetine, and yielding 10·52 per cent. of its weight to alcohol. A decoction of it gave a green coloration with ferric chloride, indistinguishable from that afforded by an equal quantity of the ordinary drug when similarly tested, thus indicating the presence of ipecacuanhic acid. The foregoing details summarised are as follows:—

From 20 grammes root.

	Per cent.
Emetine in root before extraction . . .	1·73
(a) Extracted by ammon. chloroform . . .	3·6
Portion of (a) soluble in alcohol . . .	1·51
Extracted by alcohol . . .	9·01

Total alcoholic extract—10·52

These figures agree closely with those obtained from the German sample of deemetinised ipecacuanha approved of by Drs. Kanthack and Caddy, and considered by them to be the best. I therefore suggest that a satisfactory process for removing the emetine from ipecacuanha without appreciably disturbing its other constituents consists in percolating the root in fine powder with ammoniated chloroform until completely exhausted of alkaloid, washing out the emetine from this with dilute sulphuric acid, returning the washed chloroform to the powdered root, mixing uniformly, and finally drying the product either by exposure to air or at a gentle heat.

It would be useful to ascertain to what extent that portion of the chloroformic extract other than alkaloid possesses antidy-senteric properties, but as this is a point which cannot at present be decided by chemical investigation, I hope shortly to have the chloroformic extract tried and reported upon by a medical friend.

Little is known of the particular constituent of ipecacuanha to which its antidy-senteric action is due. Some have attributed it to ipecacuanha-tannic acid, but I think this supposition admits of considerable doubt.

The isolation and identification of the antidy-senteric principle offers an excellent opportunity for useful and interesting research.

The PRESIDENT said he thought the closing remark in Mr. Holmes' paper with reference to powdered ipecacuanha was rather uncalled for. He felt sure that if the retail pharmacist were willing to pay a fair price there were some, if not many, wholesale houses who would supply him with a genuine article. The advice given was for the chemist to powder it himself, and he was perfectly sure he would have to do it himself, for the modern apprentice would certainly refuse to do it.

Mr. CONROY agreed with the President that the concluding remark by Mr. Holmes to which he had alluded had better have been omitted, for genuine powdered ipecacuanha could always be obtained from good houses. He understood Mr. Holmes to say that the nature of the emetine obtained from the real root was not identical with that obtained from the Carthaginian root, but he did not know whether any proof of that statement was advanced. If it were he should be glad to know it, for it was not an easy point to settle.

Dr. B. H. PAUL said he had lately had occasion to examine some samples of ipecacuanha for the purpose of ascertaining the amount

of so-called emetine in them. At the outset he was impressed with the defective nature of most of the methods recommended for the determination of emetine, and endeavoured in the first place to devise one by which better results could be obtained. He had not proceeded very far before it became evident that the alkaloid in ipecacuanha, to which the name emetine had been given, is by no means an independent, homogeneous chemical substance, but consists of two or more distinct alkaloids. Emetine is described as being a perfectly amorphous substance, incapable of crystallisation, and as generally obtained, either by means of chloroform or ether, from Brazilian ipecacuanha, it is always in that form; a solution with either of those solvents drying up to a perfectly transparent varnish. But when the alkaloid was sufficiently purified it could be separated into two portions, one of which was distinctly crystalline. He had with him a small quantity of these crystals, which he would hand round. So long as it was mixed with the amorphous base, there was no sign of crystallisation at all, but was the resinous transparent mass usually met with. It was not until the separation was effected to a considerable extent, which was a tedious matter, effected by continual fractional precipitation, that you got this base distinctly crystallising. But the hydrochloride of the amorphous base was a distinctly crystallisable salt, which was very soluble in water, though it would crystallise from a watery solution much in the same way as hydrochloride of morphine. With regard to the amount of alkaloid in ipecacuanha, the fact that there were two distinct substances present rendered it difficult to determine the value of ipecacuanha on the basis of the alkaloid present, until something was known of the therapeutic action of the two different alkaloids. He hoped before long to have worked out some descriptions of the characteristics of these two or three bases which he had already separated and to get them therapeutically examined, so as to learn which was the efficacious medicinal agent and what were the characters belonging to it. Altogether the knowledge of the therapeutics of ipecacuanha was very deficient, and this was well illustrated by what had been written lately about deëmetinised ipecacuanha. The reports from Indian physicians were in direct conflict with one another; some saying that the deëmetinised ipecacuanha was no better than sawdust, and others that it was very efficacious. Mr. Martindale had been kind enough to obtain for him a sample of the so-called deëmetinised ipecacuanha, supplied by the German house referred to by Dr. Kanthack, and on submitting it to

analysis he found it contained nearly .5 per cent. of the alkaloid corresponding to the ordinary alkaloid from ipecacuanha. The difference between the root and the stem attaching to what was called woody ipecacuanha appeared to him to be a result of the different relative proportion between the woody core and the bark. In the stem of ipecacuanha there was an extremely thin bark, the whole mass almost consisting of woody core, whereas in the true root there was a comparatively slender woody core and a very thick bark. He had good reason to believe that the seat of the alkaloid was entirely in the bark, and consequently it was easy to understand that woody ipecacuanha containing a large proportion of stem would contain much less alkaloid than the true root.

Mr. COLLIER said Mr. Bird's paper was very interesting to him. Patients were occasionally brought into Guy's hospital from the neighbouring tanneries suffering from a severe form of disease, acquired by handling the skins of diseased animals. It was characterised by a pustule which had to be excised, and ipecacuanha in powder was then applied to the surface, and also administered internally. This was found extremely successful in nearly all cases. Experiments had been made which showed that the ipecacuanha powder had the effect of checking the growth of the particular anthrax bacillus, but a solution of emetine in acetic acid had no such effect; a solution of tannic acid was also tried with the same result. It appeared therefore that ipecacuanha in powder certainly did stop the progress of anthrax, but emetine and tannic acid did not. What the active principle in this case was they did not know. There seemed to be something in ipecacuanha which had this power, because the root, without emetine, seemed to have been more successful in India in cases of dysentery than when it was present.

Mr. DRUCE remarked on the curious connection between two such different diseases as anthrax and dysentery; both were due to a bacillus to which ipecacuanha appeared to be fatal.

Mr. BIRD thought attention had not been given sufficiently to the resins contained in ipecacuanha to the extent of nearly 0.5 per cent. He was rather surprised at Dr. Paul's analysis of the German sample containing .5 of alkaloid, which was given in Drs. Kanthack and Caddy's account as being minimal, and it did not give one a very high idea of the reliability of German preparations. He regretted that time had not allowed of his examining the chloroform extract farther, but he hoped to do so on some future occasion.

Mr. STROTHER said some few years ago a sample of powdered ipecacuanha was offered to the house he was then in which appeared to be of a very high character, but the price was such as to lead to suspicion. After a good deal of trouble the source from which it was obtained was ascertained, and it was found to be a perfectly pure root, but it had been brought on the deck of a vessel where it got covered with sea water and full of worms. When dried and powdered it produced a very good article in appearance. He thought therefore that Mr. Holmes was quite right in suggesting that chemists should see the root from which their powders were produced.

Mr. RANSOM wished to add one word on the part of Mr. Holmes. It was not the emetine which differed in the Carthagena and Rio root, but the other crystalline body which Dr. Paul had separated. He did not suppose the emetine to be different.

The respective authors were cordially thanked for their interesting communication.

The Conference then adjourned for luncheon.

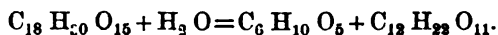
On resuming, the following paper, in the absence of the author, was read by Mr. Naylor :—

THE DETERMINATION OF THE DIASTASIC ACTION ON STARCH.

By D. B. DOTT, F.R.S.E.

The action of diastase on starch is employed analytically for two purposes : (1) the determination of diastase (or rather of diastasic power, as the molecular weight of diastase is unknown) and (2) the determination of starch. For the former purpose it is most usual to allow a known weight of the diastasic solution to act on a known amount of starch paste at a certain temperature until the mixture ceases to give a blue colour with iodine ; while for the second purpose it is customary after a similar operation to determine, by means of Fehling's solution, the amount of sugar formed, it having been ascertained that for a particular temperature the proportions of sugar and dextrin are practically constant. The work of C. O'Sullivan in this department is specially well known. He found that by the action of diastase on starch solution at the temperature

of 63° C. the starch was apparently entirely converted into maltose and dextrin, according to the equation :—



The same proportions are formed at temperatures near 63°, but for much lower or higher temperatures the equation varies. Wherefore it might fairly be assumed that by acting on starch solution with diastasic solution at 60°–65° for a certain time the diastase strength would be correctly estimated by determining the amount of maltose formed. Two objections occur to the use of the iodine method: (1) it would be difficult to make sure that the starch solution was homogeneous throughout, and so long as any particles remained unconverted by the diastase the blue colour would be developed by iodine; (2) that the end reaction with iodine is not very sharp, the blue colour passing to violet and the latter changing to red-brown, which in turn gradually disappears. On the other hand, the reaction of maltose with Fehling's solution is well defined, so that, *ceteris paribus*, the determination of the quality of maltose formed would seem the best way of determining diastase.

The experiments next described may help to elucidate the question.

1. The starch solution was in this, as in other cases, prepared by heating 20 grammes of arrowroot with 800 c.c. of water, and diluting to 1 litre. The starch is probably only in a state of quasi-solution, not in true solution; the same holding good of other colloid bodies. The malt extract solution was prepared by dissolving and diluting 5 grammes of extract to 100 c.c.; 5 c.c. of this solution were allowed to react with 400 c.c. of the starch solution for half an hour at 55°–58° C., 10 c.c. of strong soda solution being then added, and the whole diluted to 500 c.c. This was then added to 10 c.c. of boiling Fehling's solution, and the amount required to completely reduce noted; 21·5 c.c. were required.

2. The same experiment was repeated, using the same starch solution. The amount required to reduce was again found to be 21·5 c.c.

3. The same experiment was performed, but in place of starch solution, which had been heated just sufficiently to gelatinise, the starch solution was boiled for forty minutes. The amount of extract solution required to reduce was 39·0 c.c.

4. In this experiment a fresh malt extract was used, and the starch gelatinised at 98°–95° C. The test was made with the

freshly prepared starch paste. Amount required to reduce the copper solution was 33.0 c.c.

5. Identical with No. 4, except that the starch solution prepared at 93°–95° was kept for forty-eight hours before use. The amount required to reduce was 42.5 c.c.

6. Malt extract solution prepared and experiment conducted as before described, and the starch solution prepared at 90°–95° C. Required to reduce Fehling's solution, 36.0 c.c.

7. Same in all respects, except that only half the quantity of extract was used in the reaction. Required to reduce, 73.5 c.c.

8. Same as experiment No. 6, but in this case the starch solution was boiled for twenty minutes. It required to reduce the Fehling, 57.0 c.c.

9. 125 c.c. of starch solution, as in No. 6, was digested at 38° C. (100° F.) with 5 c.c. of the extract solution, and the point noted when it ceased to give any distinct colour with iodine. Time required was thirty-four minutes.

10. Same as No. 9, except that the starch solution of No. 8 experiment was employed. Time required was thirty-three minutes.

11. 135 c.c. of starch solution was digested with 5 c.c. of the extract solution at about 57° C. until no reaction was given by iodine. Time required was fifteen minutes.

12. Same experiment as No. 11, but digestion was conducted at a temperature of 36°–38° C. Time required was about thirty minutes.

Other experiments were tried, but it would only complicate the question to give further details. The experiments No. 1 and No. 2 show that when the same starch solution is employed, the results obtained by estimating the maltose are constant. The experiments Nos. 2, 3, 6, and 8 show that serious variations are caused in the amounts of maltose indicated, by the use of starch solutions prepared in different ways; the general rule being that when the starch solution has been well boiled, the amount of maltose indicated is much less than when the starch solution has been prepared at a temperature just under boiling. It may be noted here that the starch solution, even when fully boiling, did not attain the temperature of 100°, but only 98° (uncorrected). The experiments Nos. 6 and 7 show that the mass of diastasic matter employed does not appreciably affect the result (within limits at least) when excess of starch is present. The experiments Nos. 9 and 10 indicate that the iodine method gives practically concurrent results, whether the starch has been gelatinised

at the higher or lower temperature. These results would seem to show that a slightly boiled starch solution favours the formation of maltose, while a thoroughly boiled solution favours the formation of dextrin. The experiments 11 and 12 confirm what has been previously stated as to the more rapid hydrolysis of the starch at the higher temperature, and show the importance of giving the conditions of experiment, when stating the diastasic value of a malt extract.

The general conclusions are :—

1. That the diastasic value cannot be accurately determined by the amount of maltose formed, unless the starch solution is always prepared in the same way.

2. That there would be great difficulty in fixing a standard method for the preparation of starch solution such as would ensure a constant result with the same proportion of diastase.

3. That as the method of determining diastase by testing for unaltered starch and erythro-dextrin with iodine is not appreciably affected by the manner in which the starch has been gelatinised, that process must be regarded as the best at present known.

4. That by the action of malt extract on starch solution (2 per cent.) at 40° C., with 1 part of extract to 5 parts of arrowroot, the mixture should cease to give a distinct coloration with iodine after thirty minutes.

This result was obtained with the malt extract used in experiments 11 and 12, and is not an exceptional result for a good extract. In a recently published article¹ the writer states that he had never found a liquid malt extract of any diastasic value. This does not accord with my experience, as I have on several occasions examined a liquid extract which had been kept for a considerable time, and yet maintained the diastasic power given above as being indicated by a good extract of malt.

Mr. GRIERSON said he had listened with much interest to this paper, and if he had gathered its tenour aright, Mr. Dott appeared to have altered his mind as to the best method of determining the diastasic action of malt extract. Last year, when he read a paper on this subject, he questioned the reliability of the iodine method, and considered that the best method was to determine the amount of maltose formed, but now he seemed to intimate that the iodine method was the most reliable. He said that thirty minutes was

¹ *Pharm. Journ.*, [3], xxiii., 931.

the time required for malt extract to convert its own weight of starch, but with good malt extracts he considered ten minutes was quite sufficient, and he had examined many in which the process was accomplished in five minutes. He saw no difficulty in getting an homogeneous starch solution when working with small quantities such as were used in these experiments. But the kind of starch was most important, and with arrowroot starch a good malt extract ought to convert its own weight in not more than ten minutes. He could corroborate the author's statement that there were many fluid malts in the market which were very active.

The PRESIDENT said he regretted Mr. Dott was not present to give further information on this interesting subject. The thanks of the Conference were due to him for his useful contribution.

In the absence of the authors the three following papers were read by Mr. Naylor.

THE PURITY OF LITHIUM SALTS.

By H. BOWDEN.

I.—On Lithium Carbonate.

In lithium salts the lithium may be determined by a nearly similar method in all cases.

The method in general adhered to was as follows:—

To a solution of the salt about eight times its weight of pure crystallised sodium phosphate was added and sufficient caustic soda solution to render the whole decidedly alkaline, and the whole evaporated to dryness on a water-bath. Sufficient water was then added to dissolve the soluble salts, and the whole gently heated and filtered after allowing to stand for twelve hours. The precipitate was washed with a mixture of equal volumes of ammonia and water, and the filtrate and first two washings evaporated to dryness and treated with water as before; any precipitate which falls is added to the bulk. After washing well with ammonia and water, the precipitate is dried at 100° till constant, and is then Li_3PO_4 . This method is based in general on those proposed by Mayer and by Merling (*Zeitschrift für Analyt. Chem.*, 1880, 563).

The amount of carbon dioxide was determined by the loss of weight of the samples when treated with an acid. The apparatus used was one made by Mr. Hoseason, of Owen's College, and is described in another paper.

Owing to lack of time, only three samples could be determined.

Sample α :—

·4845 gramme $\text{Li}_2\text{C O}_3$ gave ·5072 gramme $\text{Li}_2\text{P O}_4$.
 ·3920 gramme $\text{Li}_2\text{C O}_3$ evolved ·2323 gramme C O_2 .

	Theory.	Found.
Li per cent.	18·93	18·89
C O_2 per cent.	59·45	59·38

The percentage of lithium found gives $\text{Li}_2\text{C O}_3$, 99·78 per cent.

Sample β :—

·6585 gramme $\text{Li}_2\text{C O}_3$ gave ·6815 gramme $\text{Li}_2\text{P O}_4$.
 ·2350 gramme gave a loss in C O_2 of ·1391 gramme.

	Theory.	Found.
Li per cent.	18·93	18·87
CO_2 per cent	59·45	59·14

The percentage of lithium found gives $\text{Li}_2\text{C O}_3$, 99·63 per cent.

Sample γ :—

·5723 gramme $\text{Li}_2\text{C O}_3$ gave ·588 gramme $\text{Li}_2\text{P O}_4$.
 ·4235 gramme $\text{Li}_2\text{C O}_3$ lost ·2513 gramme C O_2 .

	Theory.	Found.
Li per cent.	18·93	18·59
C O_2 per cent.	59·45	59·33

The percentage of lithium found gives $\text{Li}_2\text{C O}_3$, 98·2 per cent.

In these analyses the sample was simply dissolved in HCl or $\text{H}_2\text{S O}_4$, and then the method described at the beginning could be applied.

None of these samples gave a precipitate with ammonia oxalate, therefore calcium was absent.

II.—On *Lithium Citrate*.

In this salt the lithium may be determined by simply dissolving in water and applying the method at the beginning of the paper. Only two samples were analysed.

Sample α :—

·341 gramme lithium citrate gave ·139 gramme $\text{Li}_2\text{P O}_4$.

	Theory.	Found.
Li per cent.	7·41	7·36

The percentage of lithium found gives—

$\text{Li}_3\text{C}_6\text{H}_5\text{O}_{71}4\text{H}_2\text{O}$, 99·32 per cent.

Sample β :—

·5875 gramme lithium citrate gave ·2323 gramme $\text{Li}_2\text{P O}_4$.

	Theory.	Found.
Li per cent.	7·41	7·15

The percentage of lithium found gives—

$\text{Li}_3\text{C}_6\text{H}_5\text{O}_{71}4\text{H}_2\text{O}$, 96·49 per cent.

My thanks are due to Mr. Hoseason for the donation of several of the specimens analysed.

The above analyses, owing to want of time, are necessarily incomplete, and unrepresentative on account of their fewness; but the methods give an idea as to the process to be followed.

The PRESIDENT said there seemed no doubt that the samples analysed were chemically pure, and the discrepancies found were undoubtedly due to the water of crystallisation, which the author did not appear to have taken into account.

Mr. Bowden was thanked for his paper.

NOTE ON LITHIUM NITRATE.

By D. B. Dorr, F.R.S.E.

It was not my intention to contribute a note on this subject at the present time, as I had not yet carried out a complete series of experiments. The solubility of the salt does not seem to have been determined or the exact form of the crystals. Seeing, however, that a paper on lithium salts, by Mr. H. Bowden, was announced for this meeting of Conference, it appeared desirable to communicate this short note.

In the new edition of Watts' "Dictionary" the formula for hydrated lithium nitrate is given as $\text{LiNO}_3 \cdot 5\text{H}_2\text{O}$, and the salt is said to be obtained by crystallisation below 10° , on the authority of Troost. Dittmar, in his "Chemical Analysis," also states that the hydrated salt crystallises below 10° , and is a very deliquescent salt, having the formula $\text{LiNO}_3 \cdot 2\frac{1}{2}\text{H}_2\text{O}$.

I have found that the hydrated nitrate crystallises readily even at 18°C . in long prismatic crystals. These were removed from the mother liquor and dried by pressure in thick blotting paper, then dried in air bath at 110°C .

1·264 gramme lost ·574 gramme = 45·41 per cent.

Of a second quality of crystals separately dried, 779 grammes lost 3475 grammes = 44.4 per cent.

$\text{Li N O}_3 \cdot 3 \text{H}_2 \text{O}$ requires 43.90 per cent. $\text{H}_2 \text{O}$.

$(\text{Li N O}_3)_2 \cdot 5 \text{H}_2 \text{O}$ requires 39.47 per cent. $\text{H}_2 \text{O}$.

These results are distinctly in favour of the formula $\text{Li N O}_3 \cdot 3 \text{H}_2 \text{O}$. The formula given in Watts' "Dictionary" is evidently an error, the formula $(\text{Li N O}_3)_2 \cdot 5 \text{H}_2 \text{O}$ being intended, which is the same as that given by Dittmar, but more properly stated. Even allowing for the difficulty of obtaining a deliquescent salt free from adherent moisture, the fact of the crystallised lithium nitrate being a simple tri-hydrate appears most probable.

Mr. SYMONS said he thought it was quite time this subject was removed from the Blue List. It seemed to be assumed that lithium carbonate of commerce was impure, but every year he examined some scores of specimens, and they almost invariably came out at least 99 per cent. He had not seen a single adulterated sample within the last two years.

A vote of thanks was accorded Mr. Dott for his useful note.

AFRICAN COPAIBA.

By JOHN C. UMNEY, F.C.S.

I have already called attention to the principal general characters of this oleoresin as imported from the Niger basin in a preliminary note (*Pharm. Journ.*, [3], xxii., 449), and compared two samples from that source with specimens of South American origin. The results may be briefly summarised thus:—

The African oleoresin is slightly fluorescent, possesses an aromatic piperaceous smell, and has a specific gravity of 0.985 to 1.000 at 15° C. It deposits crystals on standing, and yields on distillation with steam about 40 per cent. of volatile oil.

The oleoresin does not lose its fluidity when heated in a sealed tube to 220° C., a property which distinguishes it from gurgun balsam.

The object of this additional paper is to lay before you the results of a more extended examination of the volatile oil and crystalline and other resins briefly mentioned in that note, and a comparison of them with those obtained from South American copaiba.

Volatile Oil.

The average yield of volatile oil obtained by distillation with steam from the samples of African copaiba examined was 39 per cent. The oil was of a pale yellow colour, had a specific gravity of .9185 at 16° C., and a notation of + 20° 42' with a tube 20 c.m. long at 16° C. It is soluble in its own weight of petroleum ether, in 3 parts of ether, 7 of glacial acetic acid, but is not completely soluble in 50 parts of rectified spirit or absolute alcohol. One hundred grammes of the oil was dried over chloride of calcium, and fractionally distilled with the following result:—

Below 260° C.	. . . . .	Nil.
260°-265° C.	. . . . .	62.3 grammes.
265°-267° C.	. . . . .	9.4 "
267°-270° C.	. . . . .	7.4 "
270°-273° C.	. . . . .	5.0 "
Residue	. . . . .	15.9 "

The unsuccessful attempts to obtain a crystalline hydrochloride by passing dry hydrochloric acid gas through the oil have been recorded in the previous note, the oil only becoming wine-red and letting fall a non-crystalline deposit. No crystalline product could be obtained, moreover, by passing chlorine through the oil immersed in a freezing mixture.

The dry oil yielded on fractionation over metallic sodium a blue oil boiling at 260°, and agreeing with that obtained by Brix (*Jahresbericht*, 1881, p. 1028) from the Maracaibo variety. It may be noted that this blue oil can only be obtained from the perfectly dry oil, several attempts on the moist oil resulting in failure.

Distilled with bichromate of potash and sulphuric acid a bluish green oil is obtained at 265°, the thermometer falling rapidly.

The original oil reduces rapidly and powerfully a solution of gold chloride in chloroform containing 1 per cent. of absolute alcohol, and the "iodine absorption" in sixteen hours is 251.8.

The fraction boiling at 264° C. was heated for twenty-four hours in the manner described by Wallach (*Abst. "Sesquiterpenes," Pharm. Journ.*, November 12, p. 383) with glacial acetic acid, sulphuric acid, and water, and the dark resulting liquid subsequently distilled in a current of steam. From no fraction, however, on cooling could a crystalline hydrate be obtained. From the fraction of South American copaiba oil, boiling at about 260°, a small quantity of a crystalline hydrate was obtained, agreeing in properties with the sesquiterpene hydrate obtained by the previously mentioned worker. No crystalline halogen compounds could be obtained direct from that fraction of the oil.

To determine whether any similarity in physiological action exists between the oils from the African oleoresin and those hitherto imported from South America I have submitted them to E. Hurry Fenwick, Esq., F.R.C.S. for therapeutic experiments.

This eminent specialist has kindly placed at my service his reports¹ on picked cases which he has treated with the oil in capsules each containing 10 minims. He briefly summarises his remarks thus:—"The oil possesses undoubted therapeutic powers, all the patients, with one exception, acknowledging much benefit from its exhibition. I am told by patients that it is less nauseous to take, repeats less, but is less potent in its effects than the copaiba oil at present in the market (South American). I have used it in prostatic inflammation, fresh and chronic urethritis, stricture, and pyelitis."

Comparison of Essential Oils.

Properties and Tests.	African.	Maracaibo.	Para.
Percentage of Oil.	89 p. c.	42 per cent.	{ A, 80.2 per cent. B, 64.8 per cent.
Specific Gravity.	0.9180.	0.9052.	0.9060.
Rotatory Power.	+20° 42'	-34° 18'	-28° 55'
Solubility at 15° in absolute alcohol.	not soluble 1 in 50.	1 in 1.	1 in 1.
In petroleum ether.	1 in 1.	1 in 1.	1 in 1.
In ether .720.	1 in 8.	1 in 8.	1 in 2½.
In ether .735.	1 in 8.	1 in 8.	1 in 2½.
In rectified spirit.	not soluble 1 in 50.	1 in 19.	not soluble 1 in 20.
In glacial acetic acid.	1 in 7.	1 in 5.	1 in 8½.
Range of boiling point.	260°-278° C.	245°-255° C.	252°-260° C.
Behaviour to dry hydrochloric acid gas in freezing mixture.	Becomes wine-red, turbid, deposits after a time, but no crystals.	Becomes wine-red, turbid, deposits after a time, but no crystals.	Becomes wine-red, turbid, deposits after a time, but no crystals.
Digested for 6 hours with metallic sodium and fractionated.	Blue oil, permanent.	Blue fluorescence only.	262° C., falling to 230° C. green oil.
Behaviour to chloroformic gold chloride solution with 1 per cent. absolute alcohol.	Reduces immediately, deposits metallic gold.	Becomes green, no deposit after 1 hour.	Becomes green only, no deposit after 1 hour.
Iodine absorption in 16 hours.	251.8.	257.9.	233.
Distilled with bichromate of potash and sulphuric acid.	Bluish-green, 265° -287° C.	Bluish oil, rapidly becoming brown (257° C. falling).	Blue colour, fades on standing 1 hour exposed to air (252° C. falling).

¹ I regret that the details of the reports preclude their publication in a pharmaceutical paper.

Resins.

Reference has been made in the previous communication to the crystalline substance deposited from the crude oleoresin, which by recrystallisation from petroleum ether was obtained almost colourless. The crystals are distinctly acid to litmus, electrical by friction, and melt at 124°C . The lead salt of this acid was obtained as a dense white precipitate by the addition of alcoholic solution of lead acetate to the solution of the acid in the same solvent, but all attempts to crystallise it were unsuccessful. The same difficulty presented itself in the case of the silver salt, but the potassium as well as the sodium compound was obtained in the form of feathery needle-shaped crystals. These properties are similar in many respects to those possessed by the oxycopaivic acid, separated by Fehling from a deposit from the Para variety of the oleoresin.

The residue left after the distillation of the essential oil from which the crystalline deposit had been previously separated, amounting to nearly 60 per cent. of the original oleoresin, was boiled with caustic soda and water. A considerable portion of the resin, amounting to 13 per cent., was not saponified, whilst of a sample of resin obtained from a South American oleoresin only 3 per cent. was unsaponifiable. The solution of the sodium salts of the saponifiable resins was concentrated and set aside, and produced after a short time a small quantity of needle-shaped crystals.

The crystals were separated, washed with water, and dried over sulphuric acid, and proved to be the sodium salt of a resin, differing in several respects from that mentioned above. It is much less strongly acid, and melts somewhat indefinitely at about 150°C . It dissolves with difficulty in absolute alcohol, and forms crystalline sodium and potassium salts, although itself crystallised only with difficulty.

The unsaponifiable portion was readily separated into two distinct resins, one readily soluble in cold petroleum ether, rather darker than Canada balsam, and constituting about 1.76 per cent. of the total resin, the other brittle, insoluble in cold petroleum ether, but readily soluble in chloroform, amounting to 0.6 per cent.

From these experiments it will be seen that in many respects the so-called African copaiba corresponds with that imported from South America, and points to the possibility of its being derived from one of the *Copaifera* which are known to exist in tropical Africa.

The PRESIDENT said it came as rather a new light to him that any of the copaibas were not brought from tropical America.

Mr. DRUCE thought they had been found in tropical Africa.

Mr. J. RUTHERFORD Hill said he was rather interested in the question of the crystals. The other day a chemist who had been preparing liquor copaibæ brought him about 10 grains of crystals which he said had separated from about 40 ounces of the liquid. They had not been examined, but he suggested that possibly they were a potassium salt of some resin or acid present in the copaiba, and this communication seemed rather to bear that out.

A vote of thanks was accorded to Mr. Umney for his interesting communication.

The PRESIDENT said the next two papers would be taken as read, as the figures, without which they would hardly be intelligible, since they were descriptive of new forms of apparatus, were in the hands of the engraver, but they would appear in the Journal in due course. He was quite sure the Conference would desire to record their appreciation of the ingenuity displayed by these gentlemen in their construction of two useful pieces of apparatus, and their courtesy in presenting a description of them to that meeting.

A CHEAP AND USEFUL FORM OF APPARATUS FOR THE GRAVIMETRIC DETERMINATION OF CO₂.

By. J. H. HOSEASON.

Assistant Lecturer on Pharmacy and Materia Medica in The Owen's College, Manchester.

The chief desiderata of a CO₂ apparatus are that it shall be as light as is compatible with its efficiency, and that it shall be cheap and easily constructed.

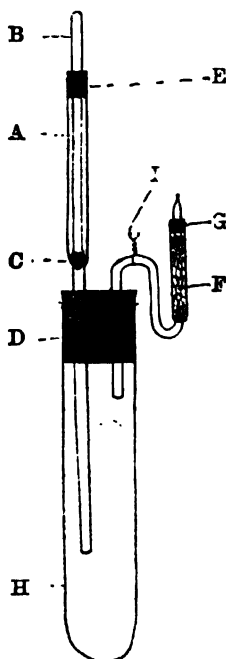
The apparatus which I am about to describe may be made by anyone with ordinary skill from a broken test-tube or two, a few pieces of glass tubing, a very short piece of indiarubber tubing, and two or three corks. The following diagram,¹ together with my description, will render the method of making and the working tolerably clear.

A is a straight tube enlarged at its upper end (easily made from

¹ The block of this illustration was kindly lent by the Editor of the *Pharmaceutical Journal*.

two pieces of glass tubing by joining). In the upper end of A works a glass rod B, which is fitted at its bottom end with a piece of indiarubber tube C. By pushing B gently down the indiarubber tube closes the orifice of A at its contracted portion. A one-holed cork E, is fitted in the top of A, through which the rod B passes.

F is a tube made somewhat like A and then bent into an S shape; the wider portion is fitted with a one-holed cork G, which



is fitted with a piece of glass-tubing drawn out to a point. The wider portion of F is packed first with a piece of cotton-wool, then with small pieces of dried calcium chloride, and with some more cotton-wool.

A and F are next fitted into the two-holed cork D, which may then be fitted into the test-tube H.

To work the apparatus.—The carbonate is weighed into H and a little water added. Then the cork E is raised and B pressed well down. The acid (H_2SO_4 , 1 to 2 will do) is introduced into the upper end of A. E is then replaced. C now forms a perfect

stopper, and no acid can get into H. The apparatus being now fitted up, the corks are well pushed in, and a piece of twisted brass wire, I, is fastened to F at its upper bend. The apparatus is then suspended by I from the beam of the balance and weighed. B is carefully slid up, and the acid flows down the lower end of A on to the carbonate in H. The CO_2 passes out of the tube F, and is dried by the CaCl_2 . After letting down a little acid-C is always pushed tightly in again. After all the carbonate is dissolved, C is slid up a little, and E is lifted up and air is drawn through by sucking at the tube in G. C and E are replaced and the contents of H gently warmed for a few seconds, and air again drawn through. This may be repeated; the loss in weight gives the CO_2 evolved.

This apparatus only weighs about 10 to 15 grammes, and is thus a great deal lighter than those commonly used. The whole may be constructed for a cost of about threepence. Using good corks the instrument is perfectly accurate, and gives as good results as the most expensive forms of apparatus.

A WASH-FUNNEL FOR OXIDISABLE PRECIPITATES.

By J. A. FORRETT.

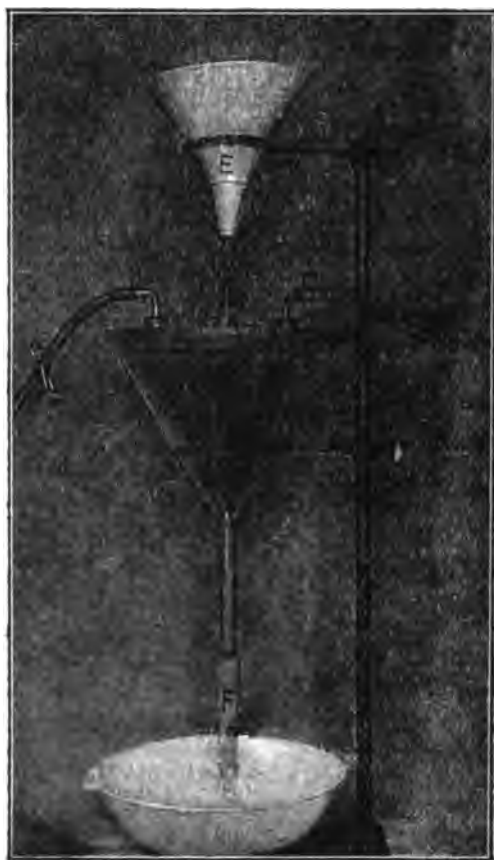
In the *Pharmaceutical Journal* of September 19, 1891, I described a wash-bottle for washing readily-oxidisable precipitates, which piece of apparatus answers perfectly for precipitating oxidizable salts produced by double decomposition. I required, however, a more rapid and thorough elimination of the soluble salt than is obtained by that means, and have found the funnel arrangement now described suitable for that purpose. See illustration.¹

The funnel A is fitted with a perforated metal cone and covered with a circular piece of wood carrying three glass tubes (B, C, and D), to which are attached india-rubber tubes furnished with spring clips. The wooden cover has also a glazed aperture as large as the diameter of the funnel will admit, to enable the operator to see the contents of the funnel. To the stem of A is fitted a piece of india-rubber tubing (F), into the other end of which a short glass tube is inserted; underneath is placed a beaker or basin of convenient size containing water, under the surface of which the

¹ The engraving of this illustration was kindly lent by the Editor of the *Pharmaceutical Journal*.

glass tube dips. Into the tube D, the stem of a second funnel (E) is inserted; both funnels are conveniently supported in the rings of a retort stand.

The apparatus is used in the following manner: a piece of fine calico is placed inside the metal cone, and the wooden top cemented



to the funnel A by means of almond meal made into a stiff lute with water, to which a little glycerin has been added. The tube D is closed, and a current of coal-gas, carbonic anhydride, or other suitable gas is passed through the funnel by the tubes B and C, to displace atmospheric air. The precipitate to be treated is

poured into the funnel E, and, by means of the clip at D, rapidly transferred to the funnel A. When the bulk of the water has passed through the funnel the tube F is closed by a clip, and the funnel A filled with boiled water through the funnel E. After the lapse of a few minutes the water is run off and the operation repeated till the precipitate is practically free from soluble salt. The tube C is now closed, and the precipitate allowed to drain.

It is desirable to maintain a gentle current of gas while the washing is being carried through; and when the tube C is closed the resulting pressure guards against the entrance of atmospheric air through any flaw in the connections.

Ferrous carbonate is the only salt I have had occasion to treat in this way, the wash-bottle referred to being used to precipitate the carbonate. With some slight modification of the funnel A, however, I believe the above arrangement could be conveniently used both for precipitating and washing such unstable salts as ferrous carbonate, ferrous phosphate, etc.

GENERAL BUSINESS.

The Formulary Committee.

Mr. W. G. CROSS moved the re-appointment of the present members of the Formulary Committee of the British Pharmaceutical Conference, viz., Messrs. Martindale, Naylor, Abraham, Greenish, Groves, Maben, Martin, Ransom, Reynolds, Symes, and R. Wright.

Mr. BURDEN seconded the motion.

Mr. COLLIER said he had much pleasure in supporting the motion. The book was very serviceable, and was much appreciated by medical men. As pharmacist to one of the largest hospitals in London, he had brought it under the notice of the committee entrusted with the formation of the "Hospital Pharmacopœia," which included not only the specialities employed there, but the whole of the preparations in the British Pharmaceutical Conference Formulary, so that it was made familiar to the whole of the students, numbering five or six hundred.

The resolution was carried unanimously.

Place of Meeting for 1894.

The PRESIDENT said the next business was to select a place of meeting for next year, and he could not but feel that any

town which invited the Conference next year would be placed in a somewhat unfortunate position in coming after Nottingham. They could not expect to receive the same lavish hospitality elsewhere, and he trusted that whatever town it might be the friends there would not feel called upon to emulate what had been done on this occasion, which it would be impossible to expect in a place which might not be one fourth the size.

Mr. DRUCE said it was rather a daring thing for any town to come forward and invite the Conference to visit it after the experience of this meeting. Oxford was a small town, and a poor town, and the pharmacists there were fewer and poorer than in many other places; but communications had passed between the Conference officers and Oxford, the suggestion being that as the British Association would visit Oxford next year the Conference should do so also. To put the matter plainly, however, if the Conference came to Oxford, the members must understand that it would be at their own expense. He did not think they could ask their brethren there to dip very deeply into their pockets, though he had no doubt they would give their assistance, and would be glad to welcome the Conference. He thought there was quite enough of interest in the town and university to prevent the necessity of any long excursion, and although he should be very fully occupied, not only in connection with the meeting of the British Association, but also with the University Extension Scheme and certain examinations, and should not be able to give as much time as he should like, he would be very glad to do all he possibly could.

Mr. CONROY asked if it was intended to hold the meeting at the same time as that of the British Association.

The PRESIDENT said that must be left for future consideration, with a view to meeting the convenience of their friends at Oxford, if it was decided to go there.

Mr. BUTLER thought it would be a great mistake to meet at the same time as the British Association. He protested against the British Pharmaceutical Conference being attached to the tail of the British Association. The success of the present meeting was almost unique, and they owed it not only to the munificence of the gentlemen connected with the pharmacy and town of Nottingham, but also to the fact that it was not held at the same time as the British Association.

Mr. DRUCE said it would be impossible for Oxford to entertain the Conference at the same time as the Association.

Mr. PAYNE (Belfast) said it was decided last year that the Conference should not in future meet at the same time, or of necessity at the same place as the British Association. He understood the hotel accommodation at Oxford was rather limited, and they should certainly not go there when it was full of other visitors. He found that no less than one hundred and sixty gentlemen had signed the attendance book at this meeting, and there were probably a good many who had not yet signed; this number was above the average for the past ten years. In 1891, the last occasion on which the Conference and British Association met at the same time and place, the number was only one hundred and twelve, a proof to his mind that the change was an advantage to the Pharmaceutical Conference.

Mr. DRUCE having explained that in all probability Oxford would be pretty well occupied until about the end of August with the University Extension movement and the British Association,

Mr. WELLS asked if any invitation had been received from any other quarter.

The PRESIDENT said no other invitation had been received for next year. There was an invitation for the following year from Bournemouth, which would be entirely independent of the British Association.

Mr. KEMP (Horncastle) suggested that it should be left to the Executive Committee to decide the place of meeting after careful consideration.

The PRESIDENT said the Executive had been in communication with Oxford, and he thought would be in favour of going there.

Mr. KEMP (Manchester) said he would propose that the matter be left to the Executive Committee.

The PRESIDENT said the Executive Committee was a comparatively small body, and it would be much better for the meeting itself to decide.

Mr. GERRARD said the Executive Committee felt gratified at the confidence reposed in it, but it would be much better to settle the matter now. There was no invitation from any other quarter, and he felt that they could not do better than go to Oxford. They did not expect their brethren there to put their hands in their pockets or provide them with board and lodging. They were quite prepared to pay their own expenses, and were willing to go wherever they were welcome on that footing.

Mr. C. SYMES then moved that the Conference meet in Oxford

next year at the end of August or beginning of September, the exact date to be fixed by the Committee.

Mr. CONROY seconded the motion.

Mr. GEORGE, in supporting it, said the manner in which each successive town tried to vie with its predecessor in the magnificence of its entertainment had, he feared, led to certain difficulties which he hoped would be removed by its being made perfectly plain that the members of the Conference had no wish to cast a pecuniary burden on the town and neighbourhood which they visited.

The resolution was then put and carried unanimously.

Presentation from the Bell and Hills' Fund.

The PRESIDENT said he had great pleasure in offering on behalf of the Conference, to the chemists of Nottingham, as a small memento of the kindly way in which they had received the Conference, the books provided by the Bell and Hills' Fund. He would ask Mr. FITZHUGH to accept the volumes, one of which, the *Pharmacographia*, would in process of time become of great value, not only from its intrinsic merit as a text-book to which they all referred, but as being unattainable in the ordinary course of trade.

Mr. FITZHUGH said it afforded him great pleasure as the representative of the local association to receive these books, and though it would not be necessary to look at them in order to recall the pleasant gatherings they had had, it would be a great pleasure to do so. If the members from a distance had only felt as much pleasure in being there as they had in receiving them he was quite sure they would never look back on their visit to Nottingham with regret. It had been a source of great satisfaction to him that nearly every chemist in the town had responded heartily to the suggestion to invite the Conference. The place of next meeting had been settled, and as to the time, he should be very glad if it could be arranged, as on the present occasion, to precede the meeting of the British Association. It had been a great pleasure to him to work with the chemists of Nottingham in preparing for this meeting, and the thanks of all were due to Mr. Bolton and Mr. Gill, the indefatigable secretaries. He did not mention the names of other members of the Committee because they had all worked most earnestly and amicably; there had not been a dissentient voice from beginning to end.

ELECTION OF OFFICERS.

The following officers were unanimously elected for the ensuing year :—

President.—N. H. Martin, F.L.S., F.R.M.S., Newcastle-on-Tyne.

Vice-Presidents.—Michael Carteighe, F.I.C., F.C.S., London; W. Hayes, Dublin; R. H. Davies, F.I.C., F.C.S., London; G. T. Prior, Oxford.

Treasurer.—John Moss, F.I.C., F.C.S., London.

Hon. General Secretaries.—W. A. H. Naylor, F.I.C., F.C.S., London; F. Ransom, F.C.S., Hitchin.

Hon. Local Secretary.—H. Matthews, Oxford.

Other Members of the Executive Committee.—C. A. Bolton, Nottingham; Peter Boa, Edinburgh; A. W. Gerrard, F.C.S., London; G. C. Druce, M.A., F.L.S., Oxford; J. Hodgkin, F.I.C., F.C.S., London; E. M. Holmes, F.L.S., London; J. C. C. Payne, J.P., Belfast; E. H. Farr, Uckfield; R. Wright, Buxton.

Auditors.—John Wilford, Nottingham; W. Clayton, Oxford.

* * * *

Mr. REEVE said he should like, before the Conference closed, to express on behalf of the Pharmaceutical Society of Australasia his thanks for the kind invitation he had received to attend the meetings, and to congratulate the President on the success of the Conference. In Australia a very deep interest was taken in the proceedings of the Conference. They had watched its progress for many years, many were subscribers to it, and they read the literature it published with much pleasure and profit. Through watching the progress of pharmacy in Great Britain they had been able to bring about a very satisfactory state of things in Victoria. They could not yet boast of illustrious names in the pharmaceutical arena, names known all over the civilised world, but they hoped to do some day; perhaps, while he was speaking, a budding Redwood was already born, or if not they might hope that he shortly would be. The Conference had been to him a feast of reason and a flow of soul, and he felt deeply grateful for the privilege of being present.

VOTES OF THANKS.

Mr. J. RUTHERFORD HILL moved:—

“That the best thanks of the meeting be accorded to his Worship, the Mayor of Nottingham, for the use of the Borough Council Chamber and the Castle Museum during the visit of the Conference.”

Very few words were needed to commend this resolution to the unanimous acceptance of the meeting, but he could not help making one general observation. It seemed to him that the whole details of this meeting had been thought out in a singularly perfect way, and that every probable requirement had been amply provided for. This remark applied especially to the use of the Council Chamber and the Museum. He had read the interesting history of that castle before coming to Nottingham, and was much pleased to make acquaintance with it. It had evidently been used for a variety of purposes, many of them of a warlike and some of a doubtful nature, but all would agree that the Corporation of Nottingham had acted very wisely in devoting it to the purpose for which it was now used. He had been at a great many receptions, but never enjoyed one more than on Monday evening.

Mr. BURDEN seconded the resolution. He said it was a great privilege to live in days when the public were not excluded from visiting ancient buildings, collections of works of art, and places of historic interest.

The resolution was carried by acclamation.

Mr. FITZHUGH, on behalf of the Mayor, said he was very glad to do all he could to further the objects of the Conference, and he only regretted that he could not be present on Monday evening. When he (Mr. FitzHugh) first asked for the use of the room the Mayor told him to do just as he pleased with that building and the Museum, and to use them as he liked. He was quite sure the Mayor would appreciate this vote of thanks.

Mr. J. LAIDLAW EWING moved:—

“That the cordial thanks of the non-resident members of the Conference be given to the Local Committee, and especially to Mr. FitzHugh, the Chairman; Mr. Bolton, the Local Secretary; and Mr. Gill, the Assistant Secretary, for their kind and most successful efforts in organising the present meeting.”

Their excellent friend, Mr. FitzHugh, had received them with very great kindness and cordiality, and they were deeply indebted to him and his estimable lady for all the attention they had shown. They appreciated his position in the town not only as a prominent pharmacist but as one who had filled the honourable office of Mayor of that ancient borough. A local secretary required business tact, foresight, and energy, and in Mr. Bolton these qualities were united in a remarkable degree. To Mr. Gill also they were indebted for his unvarying courtesy and kindness. They had received unbounded hospitality in Nottingham, they had seen the beautiful country surrounding it, and some of those stately English homes which were the pride of the country, and he was quite sure that none of them would soon forget their visit.

Mr. CONROY very warmly seconded the resolution which was carried unanimously.

Mr. C. A. BOLTON thanked the members very cordially for this expression of thanks for what had been done by the Committee with whom he had had the pleasure of working. A great deal had been said about what a secretary should be, but the Secretary and Committee were very much what the leader and chairman was. They had been specially favoured in having Mr. FitzHugh as Chairman; he was a man who, when he had anything of this kind in hand, would say, "This is the way," and as he went forward the Committee followed him, and all the more readily, as several of them had been trained under him. They had been very much favoured by the weather, which had gone a great way to making the meeting so successful. He might say that there had been no desire to excel anybody else, but simply to give the Conference a genuine Nottingham welcome, and they had been amply repaid for their efforts by the kind appreciation of the members.

Mr. GILL also acknowledged the vote of thanks.

The PRESIDENT then announced that a cablegram had just been received from Chicago in these terms:—"American Pharmaceutical Association sends heartiest greetings.—Remington."

Mr. J. C. C. PAYNE, J.P., moved:—

"That the hearty thanks of the Conference be accorded to the President for the able and courteous manner in which he has conducted the business of the meeting."

The President of this year was one whom many had looked forward to meeting with some trepidation, and probably they would have been very glad to get a look at the inside of the bag

he was in the habit of carrying to Bloomsbury Square on certain occasions, and examine the botanical specimens he brought up from his own garden in Norwich. Long before he had the pleasure of his personal acquaintance he had heard of his black bag and its contents, but he soon found that he was a very genial man, who, while he wished to examine the students fairly, had no desire to pluck them unnecessarily. In their younger days many were inclined to think that a knowledge of botany was quite unnecessary for a chemist and druggist, but most of them had formed a different opinion now, and he believed all would agree that it was a necessity for a well-educated pharmacist. It gave him great pleasure to propose this resolution.

Mr. GERRARD seconded the resolution very heartily. He had been for some years a colleague of Mr. Corder's on the Board of Examiners, and had found him to be a man of warm sympathies, and a thoroughly typical pharmacist. No one could have better represented pharmacy in the chair, and he had done his work with zeal, ability, and impartiality.

The resolution having been put by Mr. Payne and carried unanimously,

The PRESIDENT briefly thanked the meeting for the kindness and courtesy which he had met with on all hands, and for the attention which had been given to the proceedings.

EXCURSION TO THE "DUKERIES."

A large party of members and their friends left the Midland Railway station at 9 A.M. on Thursday, by special train for Mansfield, which was reached in about forty minutes. Here numerous conveyances were in attendance and the company having been joined by Alderman Douglas J. Patterson, Mayor of Mansfield, started for Welbeck Abbey, the residence of the Duke of Portland. The route passed through Mansfield Woodhouse, and soon after leaving the village the long line of carriages left the main road and followed for some distance the course of a small and much discoloured canal connected with the sewage of Mansfield. A long strip of fertile meadows sloping down from the canal gradually absorbs the sewage, while a clear stream of the filtered water is seen below abounding in trout and thus showing how complete the purification has been. Sherwood Forest was entered by a private road

which continued for several miles through some of the most beautiful forest scenery in England. The oaks are remarkably fine, and several of historical and legendary interest were pointed out. A halt was made to inspect the "Butcher's Shambles," an ancient oak intimately associated with the robber hero, Robin Hood, and his followers. Welbeck was at length reached; the stables were first visited and the splendid stud of horses was greatly admired. The party was then conducted through the extensive orchards and glass houses, where many ingenious contrivances for the promotion of successful fruit cultivation were seen and explained. A substantial luncheon was provided in the Riding School, and the usual toasts and votes of thanks followed. These were heartily received, especially that to the Duke of Portland for his kindness in allowing the party to visit the Abbey and the grounds, although closed to the public owing to a recent death in the family. From the Riding School the company descended into the long tunnel leading to the wonderful suite of subterranean rooms which are so well known as one of the chief attractions and curiosities of Welbeck. Of these rooms, the picture gallery, which was originally designed for a ball room, is the largest and most imposing. On the walls are exhibited magnificent examples of many of the great masters, including Sir Joshua Reynolds, Tintorello, Teniers, Snyders, Vandyke and Holbein. The room is lighted by day entirely from windows in the ceiling, at night it can be illuminated by over a thousand burners. On ascending into the open air the party was conducted back through the grounds to the village where the carriages were waiting for the return journey. The route selected passed by Clumber, the seat of the Duke of Newcastle, and Thoresby, the seat of Earl Manvers. At Clumber, the beautiful church, which is often described as a miniature cathedral, was seen from the bridge which crosses an arm of the lake, but time did not permit a closer inspection. Near Edwinstowe some deviation was made from the road to visit the "Major Oak," which although hollow still remains one of the largest trees in the forest. After leaving Edwinstowe the "Parliament Oak" was passed. It was under this tree that King John assembled a council of the barons in 1212, when the news of a revolt in Wales was brought to him while hunting in the forest. Mansfield was reached about 7.45 P.M., and the party was hospitably entertained to tea in the Town Hall by the Mayor. At 8.30 the special train left Mansfield and conveyed the members quickly to Nottingham after a most successful day's excursion.

The weather was all that could be desired and the arrangements made by the Local Committee were admirably designed to ensure the comfort and enjoyment of the party.

RECEPTION AND CONVERSAZIONE.

On Monday evening a Reception was held at eight o'clock by the President, Octavius Corder, Esq., in the Castle Museum and Art Gallery, by kind permission of the Mayor of Nottingham. The company was received by Mr. and Mrs. Corder, supported by Alderman Fitzhugh (Deputy Mayor of Nottingham), and other members of the Local and General Executives. The extensive galleries with their rich profusion of Art treasures were much appreciated, and the various historical associations of the Castle, recalling some of the most stirring epochs in the history of the country, added much to the interest of the occasion. Light refreshments were provided and a band played at intervals in the Castle and on the lawn. Being a warm evening the terrace was much resorted to, and afforded opportunities of renewing many old acquaintances.

The attendance was large and all circumstances combined to make the evening's entertainment a great success.

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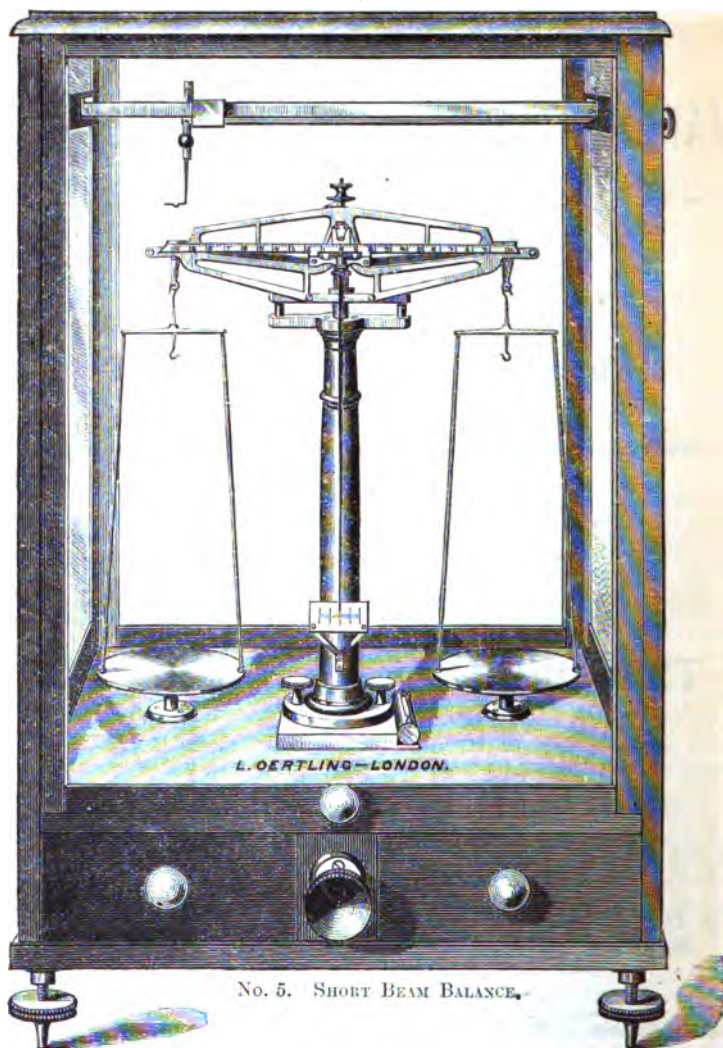
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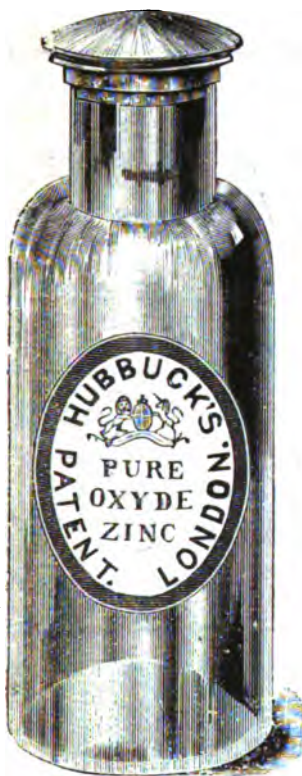
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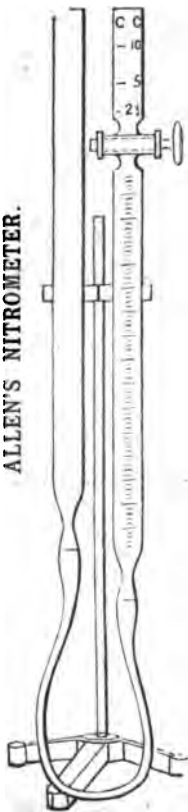


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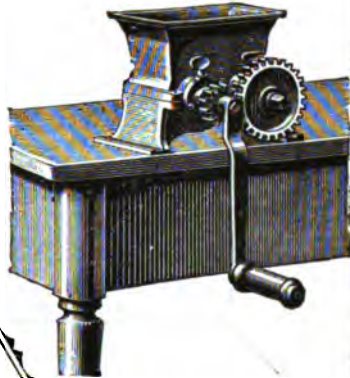
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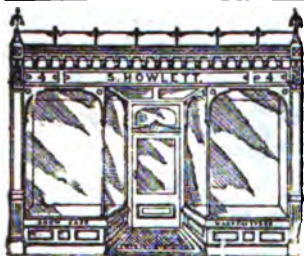
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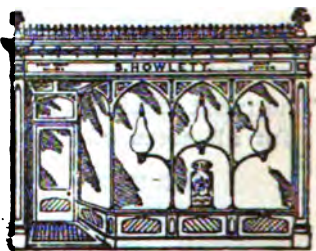
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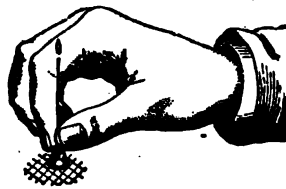
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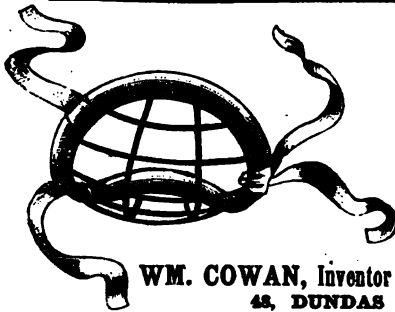
P.O.O.'s (including postage, and crossed *London and Westminster Bank*), with orders payable to **EDWARD DARKE, Secretary.**

IMPORTANT TO CHEMISTS.

ASK FOR
COWAN'S

VACCINATION SHIELDS.

Hospital Shields, 1s. 10d. per dozen; Cotton, 3s. 6d.; Chamois, 7s.; Silk, 10s. 6d.; Best Silk, 14s. Adult Size, 7s., 11s., and 18s. per dozen. They fit best, sell best, and give best Profits. They are used by Royalty. To be had of all Wholesale Houses.



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DR. RENNER'S ESTABLISHMENT FOR VACCINATION WITH CALF LYMPH.

186, MARYLEBONE ROAD, LONDON, N.W.

Vaccination from the Calf daily from 11 to 12 o'clock.

Prices of Calf Lymph.

Tubes	Large	...	...	...	2s. each, or 3 for 5s. 6d.
	Small	...	...	...	1s. each, or 3 for 2s. 9d.
Points	Large	...	...	...	1s. each, or 3 for 2s. 6d.
	Small	...	...	...	9d. each, or 3 for 2s.
Squares	...	...	...	...	2s. 6d. each.

Registered Telegraphic Address: "VACCINE," London.

Sent on receipt of remittance addressed to the Manager of the Establishment.

TO THE



TRADE.

For destroying Weeds, Moss, etc., on Garden Walks, Carriage Drives, Roads, etc.

We desire to point out the special advantages which the sale of our "Acme" Weed Killer affords the Trade.

1. The "Acme" Weed Killer is used in the gardens and on the estates of the Gentry in nearly every town in the Kingdom.
2. Our Retail Prices are such as will induce a ready sale, and we make no charge for 1- and 2-gallon tins.
3. We pay carriage on twelve 1-gallon tins, or on three 2-gallon and six 1-gallon tins, and on 10 gallons in drums and upwards.
4. Drums are charged at cost price. Full price allowed when returned.
5. By taking a 40-gallon cask, and retailing it in small quantities, the Retailer makes a large profit. Special terms for new empty 1- and 2-gallon tins if ordered with 40-gallon cask.

Trade Terms on application.

RETAIL PRICES.—In 1- and 2-gallon tins, 2s. per gallon (tins included); in 5-gallon drums, 1s. 6d. per gallon; 10, 15, and 20 gallons, 1s. 4d. per gallon; in 40-gallon casks, 1s. 3d. per gallon.

Testimonials received from Mr. HEAD, Crystal Palace; Mr. IRWIN LYNCH, Cambridge Botanic Gardens; and others.

The "Acme" Weed Killer, for Cheapness and Efficiency, has won for itself a Name throughout the Kingdom far above all others.

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Glycerine—Hand-picked Gum Arable and Gum Arable in Sorts—
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This is considered the best thing of the kind in the market for Cure of CURBS, SPAVINS, and all Bony Growths causing Lameness. No tying up; no blemish. Firing not required if this is used.

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Also MICE POISON: cannot be excelled. In Packets, 3d., 6d., and 1s. each.

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**KILLS RATS, MICE,
COCKROACHES.**

Sold by all Chemists in 3d., 6d., and 1s. Glass Jars.

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A. S. LLOYD'S EUXESIS.

FOR SHAVING WITHOUT SOAP, WATER,
OR BRUSH.

CAUTION.

The labels on genuine EUXESIS bear signature of Inventor, A. S. LLOYD, in BLACK INK, and the signature of his Widow, AIMEE LLOYD, in RED INK. Refuse all others.

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Furniture
with little
Labour.



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USED.

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BOTTLES,
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6d., 4/- doz.;
1/-, 7/- doz.

Carriage paid on 12 doz., England or Wales, assorted as desired.

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AMERICAN BAY RUM,

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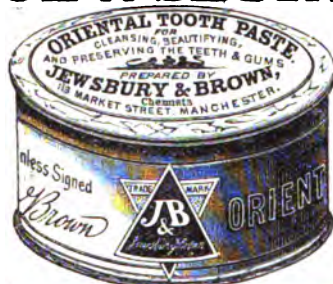
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Retail	1s. 6d.	Wholesale	12s. per doz.
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KEEPS PERFECT IN ALL CLIMATES.

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The Sweetest and most Wholesome Soap in existence.

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BLEACHED AND ABSORBENT COTTON WOOLS,

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Three Gold Medals, Two Silver Medals, and Diploma of Honour. The Highest Awards given to any Cotton Wool Manufacturers.

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RENOWNED HAIR DYES,
AND OTHER HYGIENIC SPECIALITIES.**

**EAU FONTAINE DE JOUVENCE, GOLDEN;
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3s. 6d., 6s., and 10s. 6d. per bottle.

ALSO E. F. JOUVENCE IN EVERY SHADE.

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A Delicious Oleo-Fragrance, to fix the tint after operation. 2s. 6d., 4s., 5s., etc.

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Shippers and Merchants supplied on the usual terms, and at a considerable reduction for Export in Bond.

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**Horse-Hair Friction Gloves, Belts, Bath Brushes,
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In white, grey, and black hair, of various degrees of hardness, to suit the most delicate,
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**LADY'S AND GENTS' FLESH
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No. 1 size, 36s.; No. 2, 40s.; No. 3, 42s.
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**PRINCE OF WALES BATH
GLOVE.**

For wet or dry use. 21s. per doz. Retail,
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CLARENDON FLESH RUBBER.
Hair on both sides. One surface is soft, the
other hard; either may be used for friction.
24s. per doz. Retail, 2s. 6d. each.



ARMY BATH PAD.

For wet or dry use. Hair on both sides.
A luxury for the Bath. 12s. per doz.
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For cleaning and softening the hands, and
for the Bath. In one doz. boxes.
8s. per doz. Retail, 1s. each.

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BRUSH.**

Hair on both sides, on a long
handle. 24s. per doz. Retail,
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FLESH STRAP OR BELT, AND BATH STRAP.

LADIES' quality, light hair and soft pile. GENT'S quality, black or grey, and pile of various
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THE LONDON BRUSH WORKS,
AXMINSTER,
ENGLAND.

COATE & CO.,

Is publishing a new edition of their Illustrated Price Current, tender their best thanks for the favours received for a period of 44 years.

During which time, by the patterns registered and processes patented, specially, the White Enamelled Cement, the Machinery applied, the New Machines invented, involving entire new departures in the manufacture of Tooth Brushes, etc., they believe they have taken the lead in improving the Manufacture of Tooth Brushes more than all the other Tooth Brush Makers in the world put together, whose main efforts seem to have been that of trying to imitate the style and patterns of Coats & Co., but with very imperfect success as yet.

For, as a true test of the superiority of their manufacture, Coats & Co. can say that at the present moment their customers in the capitals of the world are now supplying many of the crowned heads, princes, nobles, and rulers of Europe, Asia, Africa, and America, with Tooth Brushes made by Coats & Co.

Such being our present position in this Branch of Manufacture, we beg to assure our friends and customers that no effort or capital will be spared to hold our position and merit their continued support and approval.

We beg especially to call the attention of our customers to several new patterns of Tooth Brushes now appearing in the new edition of our catalogue, as patterns never yet made by any other manufacturer, and some of which, we think, will command a good sale. We would also note that our Anticarious patterns, specially, A, B, C, D, which were registered by us for the 1851 Exhibition, now 41 years ago, are still popular patterns, and sell well, being most effective in cleansing between the teeth without irritating the edges of the gums.

We hope and think that the actual-size Illustrations now issued, will greatly assist our customers at the retail counter, and facilitate orders per letter at home and abroad.

The drawings of each pattern signify actual size and shape, not hardness, except the patterns G H (Goat Hair), V S (Very Soft), V H (Very Hard), Y, for Yellow or Unbleached Hair, B H (Badger Hair), and U B H (Common Badger Hair). All the other patterns are made and sent out in Soft, Medium, and Hard, assorted, unless ordered to the contrary.

If best Tooth Brushes are ordered by the gross assorted, with a remark as to hardness, preferable or objectionable patterns, a better and more variety can be had than if ordered by one or two dozen per No. Observe, no Sponge Brushes, Palate Brushes, Very Soft or Very Hard, would be sent unless specially ordered to be sent in such gross, and customers who order Assorted Patterns can rely on having a nice assortment sent at once; but, when ordered to pattern, more time may be required, for although Coats & Co. held in stock on January 1st, 1893, nearly four thousand gross of Tooth, Hair, and Nail Brushes, made and partly made, yet the variety of Patterns, Qualities, and degrees of Hardness are so great that they cannot at all times keep up a large quantity of each Sort, Pattern, or Hardness.

THE FOLLOWING ARE A FEW OF THE PRICES OF OUR
MERCHANTABLE TOOTH BRUSHES:—

	Per doz.		Per Doz.
C Cemented Occasionally,	2/-	Warranted Best, stamped with Royal	
Cemented	2/6	Arms	5/6
Cemented London	3/-		
Cemented Improved	3/6	Extra Best, stamped with Trade Mark	
Cemented Warranted	4/-	and "Coats & Co., London"	6/6
Cemented Warranted Extra	4/6		
Cemented Superfine, stamped with		5 Rows	4/-; 6/-
Elephant	5/-	5 Rows, extra best and to pattern	8/-

All the above qualities are sent out assorted in patterns and hardness, except the extra best, which only can be sent to pattern.

N.B.—A Large Stock of Finished TOOTH BRUSHES, HAIR BRUSHES, etc., kept ready for Merchants' Shipping Orders.

ILLUSTRATED PRICE LIST SENT FREE ON
APPLICATION WITH BUSINESS CARD.

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Supplied in 6 Dozen Cases
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TABLE

Analysis, etc., on
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 And of all Chemists, Wine Merchants, etc.

**THE "ALPHA" BRAND
 MALVERN WATERS.**

W. & J. BURROW, THE SPRINGS, MALVERN.

W. H. CHAPLIN & CO.

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OF FINEST QUALITY.

A HEALTHFUL AND DELICIOUS BEVERAGE.

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CHEMICALLY PURE TINFOIL, ALL TIN.

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IDRIS TABLE WATERS.

IDRIS & CO., Ltd., now supply a larger number of the London Hospitals, Public Institutions, and Chemists than any other Manufacturers, which is in itself a sufficient guarantee of the excellence and purity of the Waters supplied by them.

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Invalid and Other 
 **Food Delicacies,**
IN GLASS.

No Metallic Contamination.

Absolutely Pure.

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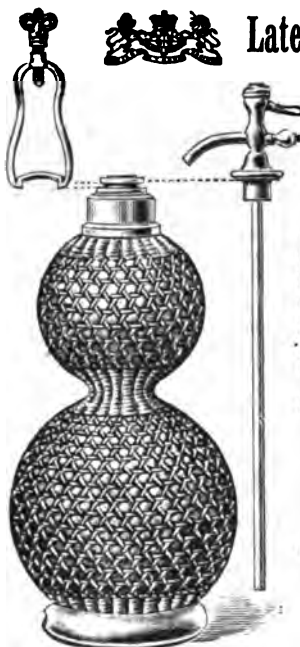
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Established nearly 50 years.

Prize Medals at all Exhibitions.

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Latest Patent for SELTZOGENES



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Eau de Vichy, Soda Water,
Sparkling Lemonade, Aerated Wines, &c.

Finding so many complaints through the screws of Seltzogenes getting worn, and customers not screwing taps on tight enough, E. G. & Co. have patented the above improvement in their Seltzogenes, which differs materially from the numerous kinds that have from time to time been introduced, there being no screwing required, thus the machines cannot get easily out of order. In place of screw on top, there is a clip, which is easily fastened to the Seltzogene, any child being able to screw the little key at top, and making perfectly air-tight the apparatus.

WEAR AND WORKING GUARANTEED.
NO MORE SCREWING REQUIRED. TAP CANNOT GET CORRODED.

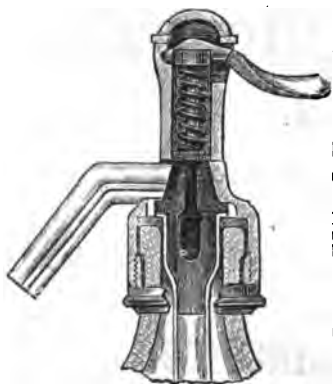
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(Oldest, Largest, and Best Manufacturers in the United Kingdom of all kinds of Machinery for the Mineral Water Trade.)

LATEST NEW PATENT SYPHONS,

WITH EBONITE FITTINGS.



PREVENTING ALL METAL CONTACT IN
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The ONLY Syphons made with UN-
BREAKABLE FITTINGS and embracing
every HYGIENIC REQUIREMENT.

No possible Leakage at the Spouts. The Best and Latest Improvements; all parts coming in contact with the water being fitted with Ebonite cannot possibly be broken.

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**NATURAL MINERAL WATERS,
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Are now imported in bottles and used in treatment of CHRONIC GASTRIC CATARRH, HYPERCÆMIA of the LIVER, GALL STONES, CHRONIC CONSTIPATION, DIABETES, RENAL CALCULI, GOUT, and diseases of the spleen arising from residence in the tropics or malarious districts.

**THE NATURAL
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Contains all the essential ingredients of the CARLSBAD MINERAL WATER. In small and frequent doses it is an efficient DIURETIC, but as an APERIENT it should be taken BEFORE BREAKFAST, in doses of from 1 to 2 teaspoonfuls, dissolved in water. To increase the APERIENT action of the Carlsbad Mineral Water, a teaspoonful of the Salt, previously dissolved in water, should be added.

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AND OF ALL CHEMISTS THROUGHOUT THE WORLD.

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“THE QUEEN OF TABLE WATERS.”

“An ABSOLUTELY PURE and AGREE-
ABLE TABLE WATER available in every part
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“REIGNS ALONE AMONG NATURAL
DIETETIC TABLE WATERS.”

“ITS NUMEROUS COMPETITORS
APPEAR TO HAVE ONE AFTER
ANOTHER FALLEN AWAY.” — *British
Medical Journal.*

“More wholesome than any aërated water which
art can supply.” — *The Times.*

“THE LEADING DIETETIC TABLE
WATER.” — *New York Tribune.*

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Whole Page	2	0	0
Half Page	1	2	0
Quarter Page	0	12	0
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